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Contents

	PAGE
EDITORIAL NOTES: The "Chemical Age" Year Book; Nitric Acid Manufacture; Setback in Chemical Exports; The Moral of a Successful Year; New Sulphate Prices; War on American Chemical Industry; Dr. Hendrick's Return	229
The Use of Promoters in Catalysis. By Alwyn Pickles, M.Sc.	232
Chemistry and the Destruction of Pests. By L. Carpenter, B.Sc., A.I.C.	233
The Examination of Essential Oils	234
The Development of Decolourising Carbons. By F. E. Thomas, M.A., A.I.C.	236
The Manufacture of Satin White	237
July Trade Returns	238
Separation of Palladium and Platinum	239
Benn Brothers, Ltd., Annual Meeting	240
Brewing Research Scheme; New Zealand Fertiliser Imports	242
Annual Meeting of Scarab Oil Burning Company; Empire Patent Rights	243
From Week to Week	244
References to Current Literature	245
Patent Literature	246
Market Report and Current Prices	250
Scottish Chemical Market	252
German Chemical Trade Notes; Company News	253
Commercial Intelligence; New Companies Registered	254

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The "Chemical Age" Year Book

WITH the beginning of the year 1923, subscribers to THE CHEMICAL AGE will receive a considerable addition to the service which the journal has hitherto rendered. This will take the form of a Year Book, Directory and Diary—free to regular subscribers to the paper and obtainable by non-subscribers for a fee of 10s. 6d.—of a more comprehensive character, we believe, than any at present available to chemists and technologists, chemical manufacturers, and chemical merchants. Uniform in size with the journal itself, the Year Book will include a diary of 52 full pages, with ample space for memoranda of engagements, etc., a classified list of chemical manufacturers and merchants, official particulars concerning educational institutions, chemical and allied societies, and trade associations, specially prepared reference tables of scientific data, expert advice to inexperienced inventors as to Patent procedure, records of market price movements, chemical names and formulæ of terms in common commercial

use, the commercial uses of industrial chemicals, useful conversion factors, a brief record of the principal events of the year, and other interesting features. This preliminary list of contents, while not exhaustive, will be sufficient to indicate the wide range of the Year Book, and most of the work has already been allocated among the large staff of experts to whom THE CHEMICAL AGE is already so much indebted for its success. Our readers will hardly need to be informed that the cost of production will be considerable, but the publishers believe in the policy of giving to subscribers the best possible service at the lowest possible rates, and are content to trust for their return to the appreciation of the public they serve. THE CHEMICAL AGE and its allied journals make no pathetic appeals to benevolent or soft-hearted friends. They prefer to depend solely on the services they are able to render to the classes they are published for, and the splendid results of the past year's trading, disclosed at the recent annual general meeting of Benn Brothers, Ltd., demonstrates the commercial soundness of this policy. The Year Book will be published early in December, and early applications are desirable. These, together with inquiries respecting advertisement rates, etc., may be addressed to The Manager, THE CHEMICAL AGE, 8, Bouverie Street, London, E.C.4.

Nitric Acid Manufacture

THE pressure on our space has precluded us from noting until now the publication of the seventh volume of the special series of reports on Technical Records of Explosives Supply issued by the Department of Scientific and Industrial Research (pp. 86, 11s.). We have by now grown so accustomed to the orderly and intelligible manner in which the information in these reports is set out that their utility is accepted as a matter of course. With the seventh volume, which deals with the manufacture of nitric acid from nitre and sulphuric acid, Mr. W. Macnab adds another to his already long list of successes, and once again it is our duty and pleasure to say that the latest report is one which should be kept close at hand by every technical chemist. The exceptional demand which arose for nitric acid during the war years is now more or less familiar to all. As was to be expected, the efficiency of operation of many of the available plants suffered severely from the scarcity of experienced personnel and the incessant need for pushing these plants beyond what would normally be considered their maximum capacity. New plant gradually made its appearance, and two factories alone—at Queen's Ferry and Gretna—were capable of turning out about 1,300 tons of nitric acid per week. The first portion of Mr. Macnab's volume is mainly concerned with the design and lay-out of the plant at Gretna, and, should the situation so change that additional plant is called

for, this section should form an indispensable reference for the designer. Apart from this, it should point the way to those in charge of plants at present operating as to the manner in which improvement might be made in details.

The third section of the report is exceptionally valuable and suggestive in that it relates to a practice which before the war was scarcely ever contemplated by nitric acid producers. We refer to the recovery of nitre (from the bags in which it is supplied) by a washing process. This is an important matter on account of the value of the nitrate thus recovered, while it also eliminates the risk of fire which always attends the storage of empty bags. First of all the bags are brushed to remove all loose crystals, and then they are boiled up in dissolving tanks. The liquor thus obtained, when of sufficient concentration, is taken to a storage tank, whence it is run through an evaporator and on to a crystallising tank. The bags are passed through rinsing tanks, wrung in centrifugals, dried in steam-heated dryers, and finally sorted out according to quality. As an indication of the economy effected, it may be noted that in one of the examples given the value of the nitrate recovered from each bag amounted (April, 1918) to practically 6d, while with an improved method of washing the cost of recovering this nitrate amounted in total to 2·32d. per bag. The moral is obvious.

Set-back in Chemical Exports

THE Board of Trade returns for the past month, compared with July, 1921, show increases in the value of British exports and imports amounting to £17,250,000 and £1,250,000 respectively, with a decline of £1,000,000 in that of re-exports. The adverse balance of trade for the month was £13,000,000, against £28,000,000 in July, 1921, and £23,500,000 in June last, and for the seven months to July 31, £92,750,000 against £81,000,000 in 1921 and £267,000,000 in 1920. Taken generally, the returns point to a healthier state of trade, the almost universal rise in exports being due not to a rise in costs and prices, but to a fairly substantial expansion in volume. An examination of the portion of the returns relating to chemicals, drugs, dyes, and colours, however, points to a large, but probably temporary, set-back on the export side, the total for the month being £340,468 less than the June total, which, with the exception of January, was the best month of the year. Although the July figure is £375,336 ahead of the value recorded for the corresponding month of last year, the unpleasant fact remains that the present figure is £112,241 less than the February total, which was hitherto the worst month of the year. While it is quite possible that large shipments may have been made at the month end, too late for inclusion in the returns, the deficit is too large to be disposed of lightly, even if the usual seasonal slackness in certain lines is taken into consideration. On the other hand, the impression that a slow but steady improvement has definitely manifested itself seems to be held by quite a large number of chemical manufacturers and merchants, and it is to be hoped that by September the export trade will have regained the satisfactory position towards which it has been steadily moving during the last two or three months.

Imports of chemicals of the total value of £831,976 were worth £46,513 less than those admitted in June; this reduction is largely accounted for by smaller imports of bleaching materials, acetic acid, lead compounds, potassium compounds, and zinc oxide. The importation of cream of tartar continues to grow after a moderate reduction in June, and the total imports for the first seven months of the year amount to 12,909 cwt. Of this total no fewer than 11,972 cwt. were imported during the last three months. The deletion of this commodity from the Board of Trade's list of dutiable articles on March 25 accounts for the large increase in its importation. Among other import increases are those recorded against sodium nitrate, distilled glycerine.

The statistics relating to exports indicate a moderate improvement in foreign trade in tartaric acid, ammonia chloride, benzol and toluol, naphthalene and bleaching powder. With the exception of those mentioned above, shipments of coal tar products generally were considerably reduced, tar oil and creosote, for instance, being 1,289,309 gallons less. Among other commodities contributing to the decline were sulphate of ammonia, sulphuric acid, carbolic acid, copper sulphate, potassium chromate and bichromate, sodium carbonate, caustic soda, sodium sulphate and chromate and bichromate, and zinc oxide.

The dyestuffs position shows little change, although the bulk of imports was 588 cwt. in excess of the previous month's figure. Exports were only 2 cwt. above those for June, but their value was £803 less.

The Moral of a Successful Year

At the annual meeting of Benn Brothers, Ltd. (reported on another page), the shareholders had the satisfaction of sanctioning the largest dividend in the history of the company. This, coupled with a bonus of 7½ per cent. to all the salaried members of the staff and a working week of five days, is a result on which directors and staff may equally congratulate themselves. It is due, as Sir Ernest Benn pointed out, not to any of the economic considerations now so much discussed, but simply to hard work, good management, and co-operative determination to succeed. The firm, through their various journals and books, touch such a large constituency that their success should have a widely stimulating influence. It illustrates how difficulties, which on some people have a depressing effect, serve only as an incentive to others, and how far the refusal to accept defeat goes to ensure positive success. In the chemical industry, confronted as it has been by difficulties for many months, there are enterprising firms which have been on a paying basis for a considerable time; they have not been content to sit down and wait for things to improve of themselves, but have employed initiative and courage to make things better. Instead of retrenching on advertisement and enterprise—a policy certain to make what is bad still worse—they have confidently pushed forward. The moral of it all is that half the difficulties of business can be solved by a courageous and confident spirit, backed always by efficient work, while a desponding attitude simply meets failure half way.

New Sulphate Prices

IT is no surprise to learn, from the circular just issued by the British Sulphate of Ammonia Federation, that the prices for September-October delivery for home agricultural use are to be advanced from £16 3s. to £16 8s. for neutral quality, while sulphate of ordinary quality, of which limited supplies will be available in some districts, will be sold at 23s. per ton less than the fixed price for neutral sulphate. The circular states that orders were booked for a very substantial quantity for July-August delivery, and the increase in prices points to a demand fully equal to, if not in excess of, the available supply. In such circumstances the price tendency promises to be still upward, especially in view of the fact, to which the Federation draws attention, that, owing to the coal strike in America, the world's supply of sulphate of ammonia will probably be curtailed to an even greater extent than seemed likely two months ago. Of late years, sulphate of ammonia has steadily advanced in popularity as a fertiliser, and the home demand now absorbs such a large proportion of the total output that but little necessity remains to search for export markets. In all the circumstances the Federation would seem to be treating the home consumer considerably in limiting the advance in price to 5s. a ton.

War on American Chemical Industry

ACCORDING to information received from the United States, it would appear that the rejection of the dye embargo forms only one of the planks in the platform of the pro-German propagandist party which is, it is said, threatening the very existence of the American organic chemical industry. There are a number of points at issue, among them being antagonism to the Chemical Warfare Service and the suppression of the technical committee's report on chemical warfare. Then there is the policy of the State Department advocating the purchase of reparation dyes through German importers in America, and the renewal of the Patent Convention, which provides that if German citizens are not required to operate under their American patents, Americans owning German patents will not be required to operate in Germany. Finally there is the direction to the Alien Property Custodian to recover from the Chemical Foundation the German patents purchased from the Custodian during the war. Although the chemical industry was not consulted on this matter, American chemists generally feel very strongly that besides leaving the Germans a protected field for exploitation, this action will do a great deal of damage to the American chemical industry. Meanwhile the Foundation, having declined to obey the demand of the Alien Property Custodian, civil proceedings will shortly be instituted when it is expected that some illuminating information on post-war German methods will be forthcoming.

Dr. Hendrick's Return

DR. ELLWOOD HENDRICK, consulting editor of *Chemical and Metallurgical Engineering* (New York), sails for the United States to-day (Saturday), after a visit of about two months to this country. His stay, it is safe to say, has been as pleasant to the host of friends he

has made over here as it has been to himself. He has been a welcome guest at a great number of public and private gatherings, and everywhere he has brought with him an atmosphere of good humour and good feeling. Occasionally he has offered some excellent counsel, and in return he takes back with him impressions and information concerning the present state of British chemical industry which should assist his American colleagues, if that is at all necessary, to a better understanding of British ways. Dr. Hendrick leaves deeply impressed with the warmth of his reception everywhere, and eagerly looking forward to the opportunity, which will be provided by the visit of representatives of British trade and technical publishing houses to New York in October, of returning the hospitality. Next week we hope to publish some impressions of his visit which he has been good enough to supply.

Points from Our News Pages

- The use of promoters in catalysis is dealt with in a contribution by Mr. Alwyn Pickles, M.Sc. (p. 232).
Mr. Leonard Carpenter, B.Sc., discusses the application of chemistry to the destruction of insect and fungus pests in agriculture (p. 233).
Some interesting information on the examination of essential oils is given by a technical correspondent (p. 234).
Mr. F. E. Thomas, M.A. (Oxon.), contributes an article on "The Development of Decolourising Carbons" (p. 236).
The Board of Trade Returns for July record a decrease of £340,468 in the value of exported chemicals, drugs, dyes and colours, as compared with the previous month's figures (p. 238).
At the annual general meeting of Benn Brothers, Ltd., Sir Ernest Benn (the chairman) reviewed the developments of the most successful year in the history of the company (p. 240).
The general trend is stated in our London Market Report to be decidedly brighter, with prices firm almost without exception, and supplies of many articles on the short side (p. 250).
According to our Scottish Market Report, there has been little change in the amount of business put through during the week (p. 252).

Books Received

- CALCULATIONS OF QUANTITATIVE CHEMICAL ANALYSIS. By L. F. Hamilton and S. G. Simpson. London: McGraw Hill Publishing Co. Pp. 196. 10s.
THE MECHANICAL HANDLING AND STORING OF MATERIAL. By G. F. Zimmer. London: Crosby, Lockwood and Son. Pp. 804. 3 gs.
A SHORT ACCOUNT OF THE TENNANT COMPANIES, 1797-1922. By E. W. D. Tennant. Glasgow: Charles Tennant and Co., Ltd. Pp. 53.
PROCEEDINGS OF THE PHYSICAL SOCIETY OF LONDON. Vol. XXXIV.—Part V. London: The Fleetway Press, Ltd. Pp. 30. 6s.
EXPERIMENTAL RESEARCHES AND REPORTS. Vol. IV., 1921. By the Department of Glass Technology, The University, Sheffield. Pp. 118.

The Calendar

Sept. 4-9	American Chemical Society: Annual Meeting.	Carnegie Institute of Technology, Pittsburgh, U.S.A.
6-13	British Association for the Advancement of Science: Annual Meeting.	City Hall, Hull.
19-22	Institute of Metals: Autumn Meeting.	Swansea.

The Use of Promoters in Catalysis

By Alwyn Pickles, M.Sc.

A STUDY of present-day Patents specifications seldom fails to reveal something connected with catalysis. A reference to current scientific literature, whether English or foreign, also shows how important the subject of catalysis really is, and also how little catalytic action is understood. Present day chemical industries are more than ever dependent for large and rapid production on various catalytic processes, and with the idea of gaining still further efficiency the use of so-called "promoter mixtures" is now the rule. A reference to any treatise on catalysis, if the treatise be a modern one, will furnish several examples, as will also a reference to the Patent Literature pages of THE CHEMICAL AGE.

Up to a few years ago, catalysts were used singly as a rule, their specific surface area, as now, being made as large as possible. It has more recently been found that a catalyst, though efficient by itself, may be further activated by the addition of small quantities of some other substance. Why such stimulation, as it were, should take place is not known, and there are no definite rules which may be applied to tell us what stimulant to add to any particular catalyst. Certain considerations are very helpful, however, and are not too theoretical in their nature.

1. The "promoter" and the catalyst must be very intimately mixed. In the case of solutions this is, of course, very easily done, but with solids, which are more general, the necessary intimacy cannot be attained by mechanical mixing. Solutions of salts of the catalyst and the chosen promoter must first be mixed, the salts chosen being such as will readily decompose on heating or be readily reduced in hydrogen after such heating. Hence the use of certain chlorides and nitrates. The support which is to be used is impregnated by thorough soaking in the solution and then dried, heated, and, if necessary, reduced in pure hydrogen.

It is sometimes worth while to add to the solution some ammonium di-chromate since this substance on heating decomposes with remarkable volume change, thus spreading the catalyst-promoter mixture. Further, a residue will be left which may act as a positive catalyst, but in any case will hardly act negatively.

2. The promoter is present in quantities, which are relatively very small compared with the catalyst proper. To determine the amount of promoter that gives the maximum efficiency is a matter for experiment. A percentage composition-efficiency curve is here helpful. The yield in the reaction tested is plotted against percentage composition of the mixture used as the catalyst material, and the resulting curve will afford some indication as to where the maximum lies if there is such a maximum. Thus, in the incandescent gas-mantle, the maximum light intensity is attained when the .9 per cent. cerium oxide is in contact with 99.1 per cent. thorium oxide. Such a maximum is well marked on the graph.

This method is, of course, somewhat tedious. The difference in composition of the promoter-mixture should be varied very little at a time for very small changes, one way or the other, may have very considerable effects. In the case of the gas mantle a percentage of .80 cerium oxide lowers light efficiency from 100 per cent. to 80 per cent., while if .10 per cent. is used the efficiency falls to 17 per cent.

The above emphasises very forcibly the need for more knowledge of the mechanism of "promotion."

3. The promoter and the catalyst should differ from each other in such factors as valency and basicity as much as possible, but the promoter selected for trial will seldom be efficient as such, if under any circumstances it may act negatively.

It need hardly be said that there are exceptions to the above very general rule. Iron will, in certain cases, promote copper as catalyst and copper, mercury. In neither case is there wide difference in basicity or in valency.

4. If a list is made of the most efficient catalyst-promoter mixtures, it is of interest to note that if the atomic number of one constituent elements is odd, the atomic number of the other will be even and *vice versa*. Thus:

Ce	At. No. 58	Th	At. No. 85	Used in the Incandescent Gas mantle.
Hg	At. No. 80	Cu	At. No. 29	Used in the oxidation of naphthalene to phthalic acid or in the Kjeldahl Nitrogen Estimation process.
Fe	At. No. 26	Ni	At. No. 27	As used by the Badische Co. for obtaining hydrogen from water gas.
Mn	At. No. 25	Mg	At. No. 12	Suggested by Reyckler, in 1889, as contact material in the Deacon's Chlorine process.
Fe	At. No. 26	Cu	At. No. 29	As used in the liberation of iodine from KI in presence of a persulphate.

This may be quite accidental, and, no doubt, as many examples could be found where the above does not hold, though the actions quoted will probably not be so efficient. Also, the above, even if true, may only be one of the factors in the problem, otherwise any element whose atomic number is odd should promote a catalyst whose atomic number is even and conversely.

Reaction Velocity

A promoter mixture may, of course, contain more than two constituents, and providing that extreme intimacy of all the constituents is assured there is no limit to the number. The aim is so to alter the atomic surface energies in the catalyst material that effects in a certain direction are at a maximum. In an article on "Adsorption" in THE CHEMICAL AGE for May 6, 1922, it was shown that such surface effects may be of considerable intensity yet readily modified by apparently trivial causes. A promoter evidently modifies these surface forces, giving them a particular direction, and maximum intensity, as it were, is ensured when the correct promoter mixture is used. Certain combinations of catalyst and promoters will achieve this just as a safe is opened by using a certain number or letter combination. This analogy may be carried still further, for just as different letter or number combinations are essential for the unlocking of different safes so different promoter mixtures are necessary for different catalytic actions. The finding of the correct combination is obviously of some difficulty, especially if three or four substances are used in the mixture.

The question will be raised: "Why should so small a quantity of promoter bring about so great a change in the reaction velocity?" Chemical change is no doubt

partly electrical in nature. Also, at atomic surfaces electrical effects are present. The so-called atomic surface is also ill-defined, and the presence of the smallest amount of foreign matter is known to have a most profound influence on the force field existing there. So in a promoter mixture, the promoting substance, because of its intimate contact with the catalyst, is certain to have some effect on the forces normally present at the catalyst surface.

Failure with a freshly made catalyst-promoter mixture

need not always be taken as final, for in some cases efficiency increases with use. Thus, in the case of the Fe-Ni mixture used by the Badische Co., previously referred to, use results in increasing the effectiveness of the mixture. Just as new machinery takes time to settle down, as it were, so it is with the catalyst mixtures just described. Use is necessary, so that the constituent elements may take up the positions best suited to the reaction in which they are employed.

Chemistry and the Destruction of Pests in Agriculture

By L. Carpenter, B.Sc., A.I.C.

THE use of chemicals for the destruction of insect and fungus pests in agriculture is becoming more and more general in these days of intensive cultivation, and is, to-day, as important as the application of manures. Indeed, in one sense insecticides may be regarded as of greater importance than manures. For, if the farmer fails to dress his land with the appropriate fertilisers, he will still probably obtain a crop, if a poor one. But failure to spray a crop may result in its complete destruction. The writer knew of a case where failure to spray a mustard crop at a cost of some £12 resulted in its destruction and a loss of about £1,000; this will give some idea of the importance of spraying with a suitable agent.

Preparations of Arsenic

Turning now to the various chemicals used, we find that there is a great variety of substances which find a use as lethal agents towards pests.

Of these arsenic in various forms is perhaps one of the most important. Arsenic in a soluble form is injurious to vegetation, causing scorching of the foliage. In certain insoluble forms, however, it is free from this objectionable property, whilst still remaining a powerful poison to insect life. Of these the arsenates of lead and calcium are examples, and lead arsenate is manufactured in large quantities for this purpose. It may be prepared by precipitating a solution of a soluble lead salt with sodium arsenate; the precipitate, which consists of a mixture of $Pb_3(AsO_4)_2$ and $Pb_2H_2(AsO_4)_2$, is filtered off, washed, and pressed until it contains not more than 50 per cent. of water; it is usually sold in this form as "50 per cent. paste." It is advisable to use sodium arsenate containing 70 per cent. As_2O_5 , i.e., monosodium hydrogen arsenate, NaH_2AsO_4 . Using lead nitrate the proportions are 2½ parts of this to one of arsenate; it is convenient to make the two solutions of equal bulk and as dilute as possible, for example, 10 per cent. lead nitrate and 4 per cent. sodium arsenate, in order to obtain as fine and light a precipitate as possible; for the same reason the solutions should be mixed cold, and water as free as possible from mineral salts used. The solutions may be made up in separate wooden vats and run simultaneously through a common chute into a large mixing vat also of wood. This arrangement ensures thorough mixing without the necessity of stirring the liquor to any great extent. Obtained in this way, lead arsenate forms a fine white suspension in water which settles quite slowly, a point of importance when it comes to spraying.

Another process consists in the direct combination of litharge with arsenic acid, a small proportion of nitric or acetic acid being added as a carrier. The product obtained with nitric acid, however, is too granular and tends to settle too quickly, but with acetic acid quite a satisfactory product can be obtained; indeed, the cruder the acetic acid the better the product from this point of view, probably owing to resinous impurities which act as deflocculents. The litharge, which should be of the fine yellow variety, and arsenic acid are mixed in a mixer, and the resulting thick, pasty mass ground with water in a pebble mill to obtain the requisite fineness.

An Electrolytic Process

A third and very interesting method which at present, as far as the writer knows, has not been used on a manufacturing scale, consists in electrolysis of a solution of a salt such as sodium

chlorate or acetate, to which arsenic acid has been added between lead electrodes. The following reactions take place:

- (1) $4NaClO_3 = 4Na + 4ClO_3$
- (2) $4Na + 4H_2O = 4NaOH + 2H_2$
(At the cathode)
- (3) $4ClO_3 + 2Pb = 2Pb(ClO_3)_2$
(At the anode)
- (4) $2Pb(ClO_3)_2 + 2H_2AsO_4 = Pb_2H_2(AsO_4)_2 + 4HClO_3$
- (5) $4HClO_3 + 4NaOH = 4NaClO_3 + 4H_2O$

The amount of sodium chlorate, therefore, remains unaltered, the lead of the anode simply combining with the arsenic acid. The product is stated to be very uniform in quality and finely divided; especially is this so when using sodium acetate as the electrolyte.*

Addition of Lime

It is of great importance that all arsenic preparations should be as free as possible from soluble arsenic for the reason already given. Lead arsenate is sold under a guarantee of not more than 0.5 per cent. soluble As_2O_5 . In order to avoid excessive washing it has been suggested that lime or magnesia should be added in more than sufficient quantity to combine with the soluble arsenic (present as arsenic acid or sodium arsenate according to the method of preparation), thus forming insoluble basic arsenates. Tri-calcium arsenate is used sometimes in place of lead arsenate, being cheaper. It is made by slowly adding arsenic acid to hot milk of lime until the mixture is only faintly alkaline to phenol-phthalein; at no time may it show an acid reaction, as this would cause the product to be too high in soluble arsenic. For this reason calcium arsenate cannot be made by precipitating a solution of a calcium salt by an arsenate, because both mono- and di-calcium arsenates would be formed, both of which show too high a percentage of soluble arsenic.

Tri-calcium arsenate is less insoluble than lead arsenate, and in contact with air and moisture it slowly hydrolyses with the formation of arsenic acid. It is not, therefore, so safe to use as lead arsenate. It should be dried and not kept as a paste, and should be stored in air-tight tins. It has been mentioned that these preparations should be fine and light, so as to give good suspensions in water. For this reason deflocculents such as glue, soap, gum-arabic, etc., are sometimes added. These substances are harmless or even beneficial in making the product more adherent to the foliage; in addition soap itself is an insecticide. A good, lasting suspension causes a more even application to the trees.

Uses of Arsenic Preparations

Preparations of arsenic are used to destroy numerous pests of the leaf-eating variety, including the mustard beetle, asparagus beetle, and Colorado beetle. They are essentially stomach poisons, acting upon the intestinal tract of the creature and are of no use upon pests which live in the substance of the plant. A 0.25—1 per cent. suspension in water is used according to the plant and the pest to be destroyed. They should not be used when the plant is in flower, as they are then liable to destroy bees. Applications are generally given one week after the blossoms fall. It is of great advantage to spray when the grubs are hatching, as the young are far more susceptible to the poison than the mature larvæ.

* For further particulars of this method see the *Journal of Industrial and Engineering Chemistry*, April, 1922, pp. 311-313.

Sulphide and Polysulphide Preparations

Among these are the polysulphides of lime known as lime-sulphur washes. The sulphur is mixed with boiling water, quicklime is added (slaked lime should not be used), and then more boiling water. A vigorous reaction ensues, and the whole is boiled until a filtered sample shows a specific gravity of 1.3 or slightly over, a result attained in about three-quarters of an hour. Preparations are also made of a lower density, but the 1.3 liquor is most valuable, as it contains higher polysulphides than are present in the lower density liquors. A convenient proportion of ingredients to use is, 3 parts sulphur, 2 parts quicklime, 10 parts water. The liquor is red in colour and should be stored in iron tanks and not in wood as it quickly penetrates the latter; it may, however, be sent out in wooden casks for immediate use.

Lime sulphur is used as a winter and summer wash, the former at about three times the strength of the latter. It is a powerful fungicide and is used to destroy American gooseberry mildew and apple scab. In use it is diluted with from 20 to 60 gallons of water (according to requirements) to each gallon of liquor. It belongs to the order of corrosive poisons of which other members are the sulphides of sodium and potassium; these are rendered more effective by the addition of alkali such as soda ash, which destroys the waxy, protective coating of the insect.

Other Preparations

Infusions of tobacco stalks which contain nicotine, as well as pure nicotine itself, are used to a great extent, and are frequently mixed with other insecticides such as lead arsenate and soap and sold under various trade names. Nicotine is a contact poison, being absorbed through the respiratory

passages and pores of the insect. It is extremely effective against sucking insects such as red spider.

Preparations of phenols are used for sterilising soil, especially in vineries and tomato houses and for other crops under glass. A preparation containing phenol, caustic soda, and soluble oil is extremely powerful in its action and can only be used on soil containing no plants. A milder preparation, however, of tar oil and soluble oil (added as an emulsifier) may be used on soil containing the roots of plants. These preparations destroy numerous soil pests such as wire-worms, slugs, and ants. Care must be taken in their use, however, as otherwise beneficial bacteria may be destroyed. Carbon bisulphide is also injected into the soil for the same purpose and is extremely effective. Naphthalene preparations are also dug in.

Bordeaux and Burgundy Mixtures

Mention may be made of Bordeaux and Burgundy mixtures. The former is made by precipitating a solution of copper sulphate with lime and filtering off the precipitate, which consists of a mixture of basic copper sulphate and calcium sulphate. The latter is similar, the lime being replaced by sodium carbonate; it forms a blue colloidal solution which should be used before it settles. It is more liable to scorch than Bordeaux mixture. Both are used against potato blight. Copper sulphate itself is used to prevent the disease known as "rust" in wheat.

Mention has already been made of soap as an insecticide. Mixed with other substances it serves to spread them more effectively, and by itself it acts slowly as a contact poison by clogging the respiratory passages of insects. Considerations of space preclude more than this very brief account of a branch of chemical industry perhaps not too well known but of great importance to agriculture and consequently to the world at large.

The Examination of Essential Oils

From a Correspondent

THE term "essential oil" is applied to a class of odoriferous substances which are either extracted, distilled or expressed from various plants. Some authorities include a few oils of animal origin; amongst these are civet, musk, and ambergris. The essential oils are widely distributed throughout the vegetable kingdom and their presence is not restricted to any section of the plant, although in some instances they are more concentrated in a particular organ; for example, in roses, the petals; in cinnamon, the bark and leaves; in nutmeg, the fruit.

Many of these substances possess pleasant odours or tastes, and are utilised principally as constituents of perfumes, essences, and also to a lesser degree in medicine, and as solvents. In essences, peppermint and clove oil are employed; in perfumery, lavender and geranium; medicinally, eucalyptus and camphor oils; and as a solvent, turpentine, which is a good solvent for the resins.

The extraction of the various essential oils—especially those which are to be used in perfumery, where it is necessary to preserve the delicate odours—is an art which is attended with much skill. The quantities of oil available for extraction is often but a small percentage, and their "winning" is attended with difficulty. For obtaining the more expensive perfumes and essences from blossoms, glycerin appears to possess very superior qualities as a solvent, and has found wide application.

The majority of the essential oils are complex mixtures and may be regarded as a blend of various chemical compounds of a most heterogeneous structure. Together with various esters, alcohols, hydrocarbons and aldehydes there have been identified ketones, phenols, phenol ethers with their homologues, also nitrites and lactones. Occasionally they consist of a single chemical compound, such as in oil of winter green (*Gaultheria procumbens*), where methyl salicylate appears in an exceptional state of purity.

Generally the essential oils are mobile, colourless liquids, displaying a remarkable instability in their affinity for oxygen when exposed to air and light. The oil becomes dark in colour and viscous, the oxidation often inducing

thin layers to dry to a hard resinous substance in the presence of moisture. These oils are freely soluble in and are miscible with most of the organic solvents, but practically insoluble in water. Their elementary composition varies widely—for example, mustard oil contains hydrogen, nitrogen and sulphur; oil of turpentine, carbon and hydrogen alone; whilst oil of peppermint consists of carbon, hydrogen and oxygen. These oils are volatile in steam in spite of the fact that their boiling points are generally well above that of water, and show certain variations in their density, refractive index, and optical activity. These differences in their physical properties appear to bear a direct relationship to the soil and climate in which they are cultivated. These characteristics are very pronounced in lavender and rose, which have been reared in different countries.

The examination of essential oils needs a wide and intimate knowledge of the chemical properties of the various compounds which experience has shown to be present in these oils. A natural aptitude to fix quickly and differentiate outstanding odours, and also ability to judge the various qualities (which often gives an indication as to the method which has been adopted in their preparation) is a valuable asset. Certain people appear to possess a highly developed sense of smell, and are often capable, through casually smelling an oil, to give a valuable pronouncement on its qualities. This is very efficacious in the art of perfumery. Cases are known where certain concentrated perfumes—for example, ionone—possess the capacity of enfeebling the olfactory nerves. This occurs to a lesser degree amongst some people with the odour of newly-cut violets.

It is often necessary in the examination of essential oils to be on the alert against sophistication: this is especially the case if the source and origin of the oils are unknown. Up to comparatively recent years adulteration was practised to a considerable extent. To evaluate an essential oil is a difficult matter. Not infrequently it is much more of a problem to interpret the results of an examination of an

oil than to carry out the determinations. At present it is customary, initially, to make a visual examination, together with those of odour and taste. If these are satisfactory, the physical constants are determined, and then follows a chemical examination. For the chemical examination the principal constituents are determined by well established chemical analytical methods, which usually entail solubility in various strengths of alcohol, acetylation, saponification, halogen absorption test for unsaturation, and, finally, tests are made for the presence of particular substances, such as alcohol, aldehydes, phenol, glycerin, chloroform and fats.

Of recent years artificial essential oils, manufactured synthetically, have come into close competition with the natural product. Considerable activity is centred round the synthesis of perfumes, many of which are mixtures the preparation of which demands a high degree of technical skill and accomplishment. In competing with the natural product in perfumery the synthetic substances appear to lack what is technically termed "refinement," which is in reality delicacy of odour. The tests to be enumerated can be applied equally well to natural and synthetic oils.

General Analysis

Tests for colour, odour and taste are valuable if carried out by an experienced worker. It is important that a standard sample of known purity should be available for comparison, tests being carried out simultaneously on the two samples—in the concentrated as well as diluted state. This latter is important, as medical authorities state that the human senses suffer a lack in "response" in various states of health. For the comparison of odour, it is convenient to allow a few drops of the oil to run on to a piece of filter paper, and the odour observed after fixed periods of time—that is, immediately and after 5, 10, 20 and 30 minutes. By this means, adulterants are often "spotted." Stale or badly treated oils are also identified in this manner.

To determine the specific gravity is a simple operation, the limits of gravity for any particular oil being well known. An oil with a deviation from the established limits is to be regarded with suspicion. It should be noted that the state of maturity of the products used in the manufacture of the oils has a direct bearing on the specific gravity. The specific gravity of the various distillates on fractional distillation is often resorted to in cases of suspected adulteration.

It is customary to determine the specific gravity by means of a 10 c.c. specific gravity bottle at a temperature of 60° F.

The congealing or solidifying point of an oil is often a good criterion of its purity. This test is generally carried out by fixing one test tube inside a larger one, the inner containing a quantity of the oil sufficient to cover the bulb of the thermometer. The whole is immersed in a freezing mixture and the congealing point is taken during agitation. The maximum temperature attained during solidification is accepted as the congealing point.

In the distillation test the results are comparable only when carried out under identical conditions. The writer has found no difficulty in obtaining comparative tests by distilling 100 c.c. from a 125 c.c. Engler distillation flask, using an upright condenser and regulating the flame at the commencement so as to distil one drop per second. The maximum of information is obtained by taking the temperatures for definite volumes distilled and the volumes obtained at definite intervals of temperature, figures which can be taken simultaneously. This test is not recommended for oils which contain esters in predominance. In this case the oil should be saponified and the ester determined indirectly by distillation of the alcohols produced. It is often discreet to carry out the distillation under reduced pressure.

The optical refraction of an essential oil is but of little value as a means of recognition of adulteration. However, the values obtained for the various fractions on vacuum distillation often give valuable evidence. A very service-

able refractometer is that of Zeiss Abbé. This instrument offers a remarkable degree of accuracy, with the use of a very restricted quantity of material. The refractive index of established constituents have been determined with much precision by various workers.

The optical activity of most oils is one of their most outstanding characteristics, this being a constant with limits for any particular oil. It is a crucial test of the purity of any well-defined oil. The instrument generally recommended for oils is the Laurent half-shadow polarimeter.

The rate and extent of solubility of essential oils in various solvents and concentrations of alcohol give valuable data in divulging adulteration. These tests need care and experience, as the presence of a small quantity of water is liable to lead to very erroneous results through the formation of emulsions. This difficulty is avoided by initial drying by means of neutral salts. The essential oils are entirely soluble in absolute alcohol, the individual oils possessing established solubilities in the various other solvents and in different strengths of aqueous alcohols. The test is carried out by noting the behaviour on mixing a definite volume of the solvents with a fixed volume of the essential oil in a small glass-stoppered measuring cylinder.

Chemical tests are only applied to advantage where there is a previous knowledge of the chief constituents of the oil under examination. The general design is to isolate or determine the outstanding components to the presence of which the oil owes its intrinsic value. The chemical methods are very numerous. The methods must be correlated to the class of substances present. We can here but give a short summary of typical methods.

1. Alcohols.

The free alcohol is best determined by acetylation by means of acetic anhydride to form the acetic ester and subsequent quantitative saponification of the ester produced.

2. Esters.

The ester content is usually determined by means of saponification with alcoholic potash. This determination is of outstanding importance, as the intrinsic value of an oil in perfumery is almost invariably due to the presence of the ester radicle, this constituting a comparatively small percentage of the oil, the remainder being apparently inert and contributing but little to its value as an oil, but possibly having a "balancing" effect on the use of the oil as a perfume.

3. Aldehydes and Ketones.

These are estimated by the formation of soluble addition compounds with sodium bisulphite, these being readily separated from the insoluble residual oil.

Occasionally it is advantageous to use a titration method. The essential oil is treated with excess of an alcoholic solution of hydroxylamine hydrochloride with formation of oximes. The excess of reagent after the reaction is back titrated.

Special methods are applicable to particular cases of oils. In this connection the methyl value has found considerable application. This value is the amount in milligrams of either of the groups, methyl, ethyl or propyl, which is substituted in one gram of the substance when treated with hydriodic acid.

Adulterants

The identification of adulterants is an art which is only acquired by a continued acquaintance and experience in the examination of oils. The substances which can be used for adulteration purposes in a particular oil are often of a limited nature. Among substances which have been found as adulterants are castor oil, phenol, turpentine oil, alcohol, glycerin, cedar wood oil, fatty oils, coconut oil, mineral oils and chloroform.

The Development of Decolourising Carbons

By F. E. Thomas, M.A. (Oxon.), A.I.C.

DURING the past few years we have had a comparatively large volume of literature dealing with decolourising carbons, suggestions as to their valuation, and patents galore for their manufacture; in fact, all the usual signs that herald a new idea. Then there has come a rest after the storm; the technical papers of the last few months have added little, if anything, to the subject. This is all as it should be, and according to precedent. Chemists are getting their second wind, and sorting out the good from the bad with a view to focussing research in the most profitable directions. It is in the belief that this sums up the situation as regards this most interesting and recent branch of physical chemistry that the writer thinks it may be worth while to give his opinion as to what one can hope for in the future and what one would like—as usual, these are not identical.

We have, first of all, to admit that although we know a great deal concerning the preparation of these carbons and their technical application, we are extremely ignorant concerning their *modus operandi*, and that consequently makes it difficult to define them—a definition of these substances is very badly needed. That, however, is of little hindrance to further investigation; it is indeed a stimulant. "Electricity" is still difficult to define, but we have managed to advance very considerably in our knowledge of the subject. It is important, however, to note and place on record that these carbons are absolutely distinct from such things as wood charcoal and animal char. They are made in a special way which, broadly speaking, consists of impregnating the raw material, nearly always of vegetable origin, with suitable protective agents, charring at carefully controlled temperatures, and removing the protective agent subsequently by washing with a convenient liquid. Thus, in their method of manufacture they differ fundamentally from animal and wood charcoal, and in their analysis they differ from them too in that decolourising carbons contain 90 per cent. and over of elemental carbon, compared with which bone-char has, as a rule, 10 to 12 per cent., and are almost free from carbon compounds, in contradistinction to wood charcoal, which contains a fairly high percentage.

It may be assumed, therefore, that "decolourising carbons" is an accepted term and not liable to lead to confusion. We have now to consider how they should be improved and our knowledge of them advanced, and in this connection we must compare them with the substance they are tending to replace, viz., animal char. Compared with the latter, decolourising carbons are very much more efficient, i.e., a very much smaller amount is required to do the same work; and they are much more costly. Previous users of bone-char seem to the writer to have erred on the side of optimism concerning the new decolourising agents. So long as bone-char was the only known agent in general use, users of it were content to wash it, to revivify it if possible, to use cumbersome pieces of apparatus such as bone-char cisterns, to throw it away after once using if revivification was difficult owing to the nature of the liquid to be filtered, and to pay the market price for it. There were very few complaints concerning its manipulation; even nowadays, when the superiority of decolourising carbons is so clearly established, many factories which could easily turn over to them from bone-char prefer to use the old method, although this may safely be put down to prejudice. When certain carbons such as Norit, Eponit, etc., came on to the market, apparently the large class of manufacturers, who required either filtration or decolourisation at some part of their process, rushed to the conclusion that the millenium had arrived. All those points that they disliked in bone-char were to be eliminated; they could use smaller quantities with the obvious advantages; they would not have to revivify, but could throw it away after once using, and so on. And then came the jar—the price of these carbons was high—too high, they said.

Now this question requires careful investigation. Any new product which is put on the market tends to be high in price at first. There are the initial experiments to pay for, the expenses of a new company, the introduction of it to the world at large, and for a few years, until the demand begins

to mean increased output, and some of the initial charges are wiped off, competitive prices cannot be expected. But, apart from that, the method of manufacture of these carbons militates against their price ever coming down to that, say, of bone-char, and the optimists do not ask more than that. To begin with, chemicals are required, and it is not always possible to recover them. The raw material, however cheap, will nearly always involve freight charges, and, roughly speaking, three tons of raw material are required for the manufacture of one ton of carbon. Any method, again, which requires careful temperature control is more expensive than one like the preparation of wood charcoal, which can be practically left to itself. Finally, there is the washing of the carbon and the subsequent drying. All this means a lengthy process and much labour and expense, and a conservative estimate would, we think, put the minimum price of decolourising carbons at twice that of bone-char—three times would be nearer the figure. The writer is certainly of the opinion that these carbons will drop eventually—there is a tendency at the present time in this direction—but it will be a long time before we get high-class carbons at three times the price of bone-char. Certain carbons have come under notice at prices about 100 per cent. above that of bone-char, but they were of poor quality and very little superior to finely powdered char. As regards price, then, it may be said that it is higher than it will eventually be, but can hardly be expected to come down to that of bone-char.

Before leaving this question of price, let us see how present prices affect users. Let us assume that a good decolourising carbon costs ten times as much as bone-char; this is rather overestimating it. The sugar refiner, for example, will only use 5 per cent. where he would use 100–120 per cent. of bone-char. He will have all the advantages of carrying less stock of carbon, of having less sugar, etc., to wash out of his cake, less fuel in evaporating his wash-water, and then he will only be paying half as much for his carbon as for his char. Moreover, he can revivify with acid and alkali—a thing he could never do with bone-char—several times before reburning is necessary. Again, a factory filtering a liquid which is not easily eliminated from the carbon, so that it has to be thrown away after one use, will save in its wastage in material absorbed by the cake by using a smaller amount of carbon compared with the larger amount of bone-char. For these reasons, and others, the question of price need not be regarded as such a serious factor in the use of these carbons, though it still remains an important point.

Next comes the question of revivification, which is a very important one. There are several highly efficient carbons on the market which have excellent filtration and decolourising properties *for one use only*. If they are revivified or reburnt their structure breaks down, and a high percentage of fine particles results which will decolourise but not filter, and one is of no use without the other; in fact, filtration is rather the more important of the two. Now, even if decolourising carbons were £5 a ton, they will be revivified if they will stand it, and in the long run a carbon that does not possess a structure that will allow revivification will either be driven out of the market or will only find a limited application in those industries which only use carbons once. A man may put on the market cheap plates, which can be thrown away after use, but if another man, at very little extra cost, puts on a similar plate which can be washed a few times before being discarded, he stands a better chance of holding the market.

Another very notable fact about these carbons is their selective action. If, say, a raw sugar solution be treated with a certain percentage of each of two carbons A and B, A being used first and then B, the colour and time of filtration will not always be the same as if B were used first and then A, nor will the decolourisation effected by either of these methods be the same as if the two carbons were used together and simultaneously. Whether we shall ever get a carbon which will have all the powers of the various carbons known is doubtful, but it would seem possible, and therefore probably desirable that a carbon could be prepared with a larger

variety of powers than any known at present, and consequently more efficient. This is, however, a matter of opinion, and we return to it later.

There are, then, certain considerations to be borne in mind which should help to define the direction in which further research on carbons should be made:—

(1) *Price*.—The question of reducing prices will largely solve itself when demand increases. There is, however, the fact also to be borne in mind that it is very difficult at present to collect the by-products when charring. In the case of one well-known carbon the writer has been told that it has been found impossible to save any of these. That is to say, one sets out with the idea of manufacturing a decolourising carbon by means of a process specially adopted to yield that product, any other substance produced being regarded as merely incidental and a by-product. Here is an opportunity for chemical research of a most profitable kind. If the distillation products can be recovered, it would make the decolourising carbon itself almost a by-product, and prices would come down with a rush. This problem has already engaged considerable attention; it cannot be regarded as insuperable, but only as very difficult. The first person to solve it will have made a big advance in the industry and will reap a rich harvest, but, in solving it, he must see that the quality of his carbon is not affected in any way deleteriously.

(2) *Revivifying power*.—We repeat that we do not think any carbon at the present time, or until the by-product question has been solved, will get a big market unless it can be revivified. The number of industries which can afford to or have to throw away carbons after once using is small compared with those that can, and who would find it profitable to, revivify them. Decolourising carbons, besides decolourising, are excellent filtering agents, and are used as such in industries where no colour, or very little, is required to be abstracted. There are very few industrial concerns where filtration of something or other is not required as a regular process.

(3) *Efficiency*.—Here it is largely a matter of opinion and experiment. Decolourising carbons are extraordinarily efficient, and it will probably be found that any process which will increase efficiency by producing wider powers in the carbon will be too expensive. Rather is it desirable to standardise the product, and there are problems in connection with this point. The days when every new carbon was heralded as more efficient than all those that had gone before are practically over. It would be excellent, of course, to have better carbons, but until some fundamentally new method of manufacture is evolved, we are not likely to get them. Standardisation, such as the bone-char industry may be said to possess, is a more desirable quality, and one may suggest that attempts at increased efficiency may well be shelved for the present.

Of the points mentioned, that of reducing price offers the most inviting and difficult problems, and they seem to be more engineering than chemical in character. We do want answers, however, to such questions as why certain raw materials make better carbons than others. Is it composition, or structure, or what? We want, too, more research into the why and wherefore of the action of these substances. The principles of colloidal chemistry, surface tension, and so on, want to be brought to bear on the questions of filtration and decolourisation by means of carbons. In other words, it is time that we ceased from the commercial side, by which is meant the manufacture of fresh carbons, turned from empirical work to the theoretical side of the matter, and studied more closely the results of the practical work hitherto obtained.

A Titrimetric Determination of Aluminium

A TITRIMETRIC method of determining aluminium is advanced by E. J. Kraus in the *Chemiker Zeitung*, according to which the aluminium is precipitated as hydroxide, and after separation from iron is dissolved in sulphuric acid, the amount of acid used being such as to make the solution neutral or slightly acid. Drops of a solution of silver nitrate are then added, and the solution is titrated with a standard solution of Na_2HPO_4 , which produces a white precipitate of AlPO_4 . The end point of the reaction is reached when a drop of the reagent causes a yellow colouration due to the formation of Ag_3PO_4 .

Manufacture of "Satin White"

A Practical Method

THE important substance known in the trade as "Satin White" is used largely as a pigment but probably its chief use is in the coating of paper. According to an article on this substance in *Chemical and Metallurgical Engineering*, Satin white is essentially calcium aluminate mixed with hydrated calcium sulphate. Its preparation, however, does not merely depend upon the chemical reactions necessary to produce these compounds, but also upon the physical conditions of its manufacture. Neglect of the latter may result in a product worthless as a pigment and which, indeed, may not be satin white at all as understood in the trade.

The following is a description of making a satin white of good quality: The quantities stated indicate the proportions in which the constituents should be employed, but it is obvious that they will vary according to the scale on which it was desired to manufacture the material:

85 kilos. of caustic lime dissolved in 200 litres of boiling water is diluted with water up to 450 or 500 litres, and the solution passed through a fine meshed screen. The cold solution is then pumped to a churn of 1,500 litres capacity where a cold solution of 125 kilos. of aluminium sulphate (containing 18 per cent. of alumina) in 500 litres of water is added quickly and the churn agitated vigorously to ensure a thorough mixing. The mixture is then strongly heated until reaction is complete and a high degree of viscosity is attained. The reaction is exothermic, giving rise to a high temperature, and results in a thickening of the mass.

At this stage 1,200 litres of water are added to it by which the mass is converted into a viscous syrup which can be drawn into lustrous thread-like strings. This syrup is transferred to a large vat of about 7,000 litres capacity provided with agitating gear and water added to make up a total volume of about 6,000 litres.

This liquor should be alkaline, the degree of alkalinity being such that 100 c.c. should take 24 to 25 c.c. of N/10 oxalic acid to neutralise it. If an excess of alkali is present, the addition of 4 kilos. of sulphuric acid of 40° Beaume more than counteracts this, and the correct degree is brought back by adding more aluminium sulphate of the same composition as that originally employed. This substance is really a mixture of alumina and aluminium sulphate in which only 80 to 85 per cent. of the aluminium is combined with sulphuric acid and the remainder with oxygen.

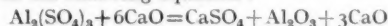
The properties of this mixture are, therefore, basic.

Care must be taken to avoid the presence of iron, otherwise a yellow product results. A faint yellow tinge can be counteracted by the addition of indanthrene blue in the form of a solution of 250 c.c. of the pasty dye to 5,000 c.c. of water. From 100 to 150 c.c. of this solution is sufficient to treat one charge of the satin white of the above quantity. The satin white is now filtered off, and when properly made is a pure white lustrous mass which when added to water forms a creamy mixture from which the pigment settles very slowly.

The chemical reaction of the formation of satin white by this method is believed to be expressed by the following equation:



The lime used must be of a good grade, free from iron, sand, and carbonaceous material. The sulphate of alumina should, as already stated, contain free alumina. The sulphuric acid content of this salt can be controlled by adding lime in the form of milk of lime, but the calcium sulphate formed must be filtered off. If allowed to remain suspended in the solution, no satin white is formed but a solid mass. The reaction is expressed in the following equation:



Laboratory investigations have proved that a very good satin white can be made by the following method, which is also quite a reliable one:

90 grams of lime slaked in 220 c.c. of boiling water, to which 130 grams of finely pulverised aluminium sulphate of the same degree of sulphate and oxide as expressed above are added. The mass is heated until it becomes almost solid, then 250 c.c. of water are added and the mixture agitated thoroughly until the product reaches the desired condition.

W. G. R.

July Trade Returns

A Decline in Exports of Chemicals

ACCORDING to the Board of Trade Returns for July, the exports of chemicals, drugs, dyes, and colours at £1,444,643 were £340,468 less than in the preceding month, while imports, at £831,976, were £46,513 less. As compared with July, 1921, the export total for the present month shows an advance of £375,336, while the total of imports is £90,710 more.

Imports of Chemicals

A comparison between quantities imported in July and June of this year respectively indicates decreases under bleaching materials, acetic acid, lead compounds, potassium nitrate and other potassium compounds, and zinc oxide. Cream of tartar, which was subjected to a slight check in June, shows an increase of no fewer than 677 cwt., the total imports for the seven months ended July 31 being 12,909 cwt., against 17,143 in 1921 and 35,023 in the corresponding period in 1920. Other increases were apparent under tartaric acid, borax, calcium carbide, glycerine (crude and distilled), and sodium compounds. Of these increases the most notable are sodium nitrate, increased by more than 100 per cent. and distilled glycerine by nearly 300 per cent.

The detailed import figures, in cwt., unless otherwise stated, are given below, with the June figures in parentheses. Increases: Tartaric acid (including tartrates not elsewhere specified), 5,788 (5,432); borax, 3,299 (3,005); calcium carbide, 20,648 (17,263); crude glycerine, 4,739 (3,406); distilled glycerine, 239 (86); sodium nitrate, 42,464 (20,740); sodium compounds other than nitrate, 10,825 (10,745); and cream of tartar, 4,124 (3,447). Decreases: Acetic acid (including acetic anhydride), 371 tons (567); bleaching materials, 2,117 (4,171); red lead and orange lead, 1,944 (3,155); potassium nitrate, 11,642 (13,095); potassium compounds other than nitrate, 124,602 (157,689); and zinc oxide, 465 tons (500).

Decline in Sodium Compounds

On the export side tartaric acid, ammonia chloride and glycerine all show moderate increases, while benzol and toluol and naphthalene are the only coal tar products for which increases are registered. The bulk of bleaching powder exports is only slightly higher, but the proportion taken by the United States has increased considerably, the quantity being 673 cwt. against 53 cwt. in June.

As might have been expected, exports of sulphate of ammonia failed to maintain the higher standard reached in June, when the total of 11,563 tons was nearly two and a half times more than the figure recorded for May. Of the July total of 7,387 tons the Dutch East Indies took 2,753 tons; Spain and the Canaries came next with 1,826 tons, and were followed by the British West Indies with 660 tons; France, with 243 tons; Italy, with 106 tons; Japan, with 1 ton; other countries, which are not enumerated, took 1,798 tons. All sodium compounds were individually less and the total was nearly 100,000 cwt. less than the total June shipments. Copper sulphate, which fell from 6,571 tons in May to 4,682 tons in June, shows a further decline of 3,366 tons.

The following figures show in detail the products, the June exports of which were larger (as to quantity) than in the preceding month; the June figures are given in parentheses and the amounts are in cwt., unless otherwise stated: Tartaric acid (including tartrates not elsewhere specified), 278 (195); ammonia chloride (muriate), 437 tons (347); bleaching powder, 26,811 (25,581); benzol and toluol, 8,557 galls. (4,544); naphthalene, 1,516 (1,480); coal tar products, other sorts, 24,889 (15,476); crude glycerine, 2,325 (1,546); distilled glycerine, 3,180 (2,949); potassium nitrate, British Prepared, 1,200 (851); and potassium compounds, other than chromate and bichromate and nitrate, 1,866 (1,815).

The decreases, similarly compared, are: Sulphuric acid, 1,278 (1,531); sulphate of ammonia, 7,387 tons (11,563); carbolic acid, 6,130 (10,917); naphtha, 2,709 galls. (6,011); tar oil, creosote, etc., 2,607,337 galls. (3,896,646); copper sulphate, 1,316 tons (4,682); potassium chromate and bichromate, 2,042 (2,500); sodium carbonate (including soda crystals, soda ash and bicarbonate), 328,377 (368,948); sodium caustic, 126,107 (136,307); sodium chromate and bichromate, 3,630 (4,107); sodium sulphate (including saltcake), 119,610

(142,420); sodium compounds, other sorts, 36,027 (50,920); and zinc oxide, 318 tons (509).

Dyes and Dyestuffs

There were again no imports of coal tar intermediates (including aniline oil and salt and phenyl-glycine), so that the total imports for the first seven months of the year amount to 1 cwt. (imported in May) of the recorded value of £22. Imports of alizarine dyes were down by 23 cwt., but there were considerable increases of natural indigo and finished coal tar dyestuffs other than alizarine and synthetic indigo. The total quantity of finished coal tar dyestuffs imported during July was 2,719 cwt., valued at £85,271; the imports in June totalled 2,131 cwt., but in July, 1921, the total only reached 431 cwt., as compared with 13,442 cwt. imported in July, 1920. The comparative figures for July and June this year are: Alizarine, 153 (175); finished coal tar dyestuffs other than alizarine and synthetic indigo, 2,567 (1,956); cutch, 2,308 (2,099); extracts for dyeing, other sorts, 6,660 (10,980); natural indigo, 196 (45); extracts for tanning, solid or liquid, 72,786 (44,613).

Exports of dyes and dyestuffs were 2 cwt. more than in June, but the value was £803 less. The total of 7,763 cwt. (as against 7,761 in June), made up of 3,668 cwt. of coal tar products (as against 4,000) and 4,095 cwt. of other sorts (as against 3,761), was valued at £68,202, while the previous month's exports amounted in value to £69,005.

Painters' Colours and Materials

There was an all-round increase in imports of painters' colours and materials, with the exception of ground barytes and blanc fixe. Exports in this section all show increases and the bulk total was 14,559 more than the June figure. The comparative figures are: IMPORTS: Ground barytes (including blanc fixe), 40,218 (44,566); white lead (basic carbonate), 12,405 (9,845); painters' colours and materials, other sorts, 63,058 (59,991). EXPORTS: Ground barytes (including blanc fixe), 12,334 (7,573); white lead, 19,997 (18,724); paints and colours, ground in oil or water, 22,054 (20,389); paints and enamels, prepared (including ready mixed), 18,214 (14,878); and painters' colours and materials, other sorts, 46,565 (43,041).

Scientific Instruments and Glassware

Scientific glassware (except tubing and rod) was imported to the value of £4,096, as compared with £5,350 in June, while 324 cwt. of glass tubing and rod, valued at £1,148, were imported, as against 700 cwt. of the value, £2,446, imported in the preceding month. Exports of tubing and rod totalled 60 cwt., worth £414, against 200 cwt., and the value of £1,519, shipped in June. We imported 102,724 gross of glass bottles and jars, as against 105,121 gross, and exported 28,520 gross, as compared with 28,651 gross.

Scientific instruments and appliances (except electrical) were imported to the value of £34,381, against £35,471, while the exports under this heading totalled £69,908 as compared with £66,006.

Coal exports were 270,115 tons more at 5,063,763 tons, and were worth £5,579,538, as compared with £5,391,946.

The Fertiliser Trade

Imports of raw guano totalled 567 tons (as compared with nil in June), the total imports of this commodity during the seven months to July 31 amounting to 6,032 tons, as compared with 5,540 in July, 1921, and 2,278 tons in the corresponding month of 1920. Phosphate of lime and rock phosphate dropped from 40,517 tons in June to 32,944 tons in the month under review. An increase of 2,537 tons is noted under imports of basic slag, the month's total amounting to 10,117 tons of the value of £32,213. Exports of basic slag show a decrease of 78 tons, at 29 tons of the value of £75. In July, 1921, there were no exports of this commodity, but in the previous July the figure was 1,084 tons, valued at £9,023. Superphosphates registered a comfortable increase from 219 to 318 tons, and fertilisers, other sorts, rose from 1,322 to 2,478 tons.

Under the heading boron minerals (including borate of lime, borate of magnesium and boracite) the imports for the month are given as 3,997 tons, of the recorded value of £80,456, as compared with 677 tons, valued at £13,637, imported in the previous month. In July last year the imports only amounted to 13 tons of the total value of £244; there were, of course, no exports under this heading. Crude sulphur was admitted into this country to the extent of 2,719 tons, of the value of £11,534, against 3,946 tons, valued at £16,972 in June.

Imports of Oilseeds

The imports of seeds for expressing oil comprised 2,697 tons of castor seeds, worth £44,680, while the division relating to nuts and kernels for expressing oil includes imports of 2,499 tons of copra, 3,118 tons of ground nuts, 19,548 tons of palm kernels, and 81 tons of other sorts. Soya beans of a total weight of 16,965 tons, worth £214,200, were imported, no fewer than 9,563 tons being recorded as having come from Russia. Japan supplied 4,427 tons and China furnished the remainder.

Palladium and Platinum**Separation by means of Dimethylglyoxime**

IN the investigation of methods for assaying platinum conducted by the U.S.A. Bureau of Mines, recent experiments have shown that with certain ores, especially when the quantity of platinum is considerable, nitric acid will not effect a separation of platinum and palladium. The following method (as described here by Mr. C. W. Davis, assistant chemist to the Bureau) has been found to be accurate and to result in a complete separation of these metals.

Wunder and Thuringer* have developed methods for the separation of palladium from all the platinum metals except platinum by means of dimethylglyoxime. They state that there is no action for several hours if an excess of dimethylglyoxime is added to an aqueous solution of chloroplatinic acid in the cold, also that only on boiling is the platinum precipitated and then only part of the platinum is removed from the solution. They found that palladium is precipitated quantitatively in the cold as $(C_6H_8N_2O_2)_2Pd$ which is insoluble in water, dilute hydrochloric acid, dilute acetic acid or in 50 per cent. ethyl alcohol. All of their precipitations were carried out while the solutions were being heated. This caused a partial precipitation of the platinum along with the palladium.

A few preliminary tests substantiated the belief that palladium could be precipitated free from platinum if a solution of the chlorides of these metals be treated at room temperature with an alcoholic solution of dimethylglyoxime. The following procedure was worked out to separate and determine platinum and palladium quantitatively.

Procedure

The platinum and palladium free from the other platinum metals are obtained by the method given in U.S. Bureau of Mines Technical Paper 270. These metals are ignited and cooled in an atmosphere of hydrogen and weighed together. The weighed metals are dissolved in a little aqua regia and evaporated just to dryness. The residue is moistened with a drop of hydrochloric acid and, after the addition of a little distilled water, a solution of dimethylglyoxime is added, drop by drop, with constant stirring until there is no further precipitation. After standing at room temperature for a few minutes the voluminous yellow precipitate is filtered off, washed thoroughly with distilled water and ignited slowly and carefully, first in air to drive off organic matter and then in hydrogen to reduce any oxidised palladium to the metal. The metallic palladium is then weighed.

The platinum may be found by difference or it may be recovered and weighed. To recover the platinum the filtrates from the palladium precipitation are carefully evaporated to dryness in a small pyrex beaker or porcelain dish, a little nitric acid being added as the volume becomes small. The residue is heated almost to redness to drive off all organic matter the presence of which would prevent the complete precipitation of platinum. The residue is extracted with a little aqua regia, is evaporated just to dryness, is extracted with a drop of hydrochloric acid, and is diluted with a little distilled water. The solution is made alkaline with sodium carbonate, acidified with an excess of formic acid, and boiled to precipitate the platinum, which is filtered off, washed, ignited, and weighed.

Further Details

The dimethylglyoxime solution is prepared by dissolving one gramme of dimethylglyoxime in 100 c.c. of 95 per cent. ethyl alcohol.

* Wunder, M., and Thuringer, V. (Ann. chim. anal., t 17, 1912, pp. 201 and 328) (Compt. rend., t 30, 1913, p. 12) Ztschr. Anal. Chem. Bd. 52, 1913, pp. 33, 101 and 660.

If the palladium content is high it may be necessary to dissolve the recovered palladium in nitric acid, take to dryness with hydrochloric acid, take up with a drop of hydrochloric acid and a little water and again precipitate the palladium with dimethylglyoxime solution. Any platinum that may have been occluded in the first precipitation is now in the filtrate from the second precipitation, and is recovered in the same way, by evaporation, ignition, solution, and precipitation.

If the palladium content is low (less than 0.5 mg.) it is advisable to add but a few drops of water to the platinum-palladium chloride residue that has been moistened with a drop of hydrochloric acid and then to add but a few drops of the dimethylglyoxime solution. This procedure will hasten the precipitation of the palladium and cause it to form in a coagulated condition.

The use of cut-down funnels and filter papers is desirable when small amounts of palladium are encountered.

Alundum boats and a tube combustion furnace are convenient for igniting the palladium.

Typical Results

The following results were obtained from weighed samples of pure platinum and palladium, the palladium being precipitated in the presence of the platinum.

Palladium used, mg.	10.77	10.72	5.46	1.42	0.14
Platinum used, mg.	0.15	1.58	5.76	0.91	11.00
Palladium recovered, mg.	10.79	10.72	5.44	1.44	0.15
Platinum recovered, mg.	0.14	1.59	5.75	0.90	10.97

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

LONDON (August 29).—Refined tar. Particulars from D. A. Nicholl, Council House, Wandsworth, London, S.W.18.

WOODFORD (August 26).—Creosote oil, tar and pitch. Particulars from W. Farrington, Council Offices, Woodford Green, Essex.

MANCHESTER (August 22).—Oxygen and acetylene gas. Particulars from H. Mattinson, 55, Piccadilly, Manchester.

LONDON (September 11).—Lead, copper, grease, tallow, lubricating oils, linseed, etc. Particulars from W. Moon, 173, Rosebery Avenue, London, E.C.1.

LAMBETH (August 29).—Disinfectants. Particulars from H. E. Anderson, Town Hall, Brixton Hill, London, S.W.2.

DOVER (September 4).—Lime, paints, oils, spirits, tar, Portland cement, lead, etc. Particulars from R. Mowll, Dover Harbour Road, Castle Street, Dover.

MANSFIELD (September 4).—Conveyors, etc. Particulars from W. Thompson, Market Street, Mansfield.

EGYPT (October 2).—Tieröl (for denaturing ethyl alcohol), about 3,000 litres. Particulars from Department of Overseas Trade, 35, Old Queen Street, London. (Reference No. D.O.T. 8759/F.E.)

BUENOS AIRES.—Sulphuric acid, 66° Bé, about 5,000 tons, aluminium sulphate, 12,000 tons. Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London. (Reference No. D.O.T. 4390/F.L./C.C.)

FINSBURY (September 4).—Creosote oil and tar. Particulars from Borough Surveyor, Finsbury Town Hall, Rosebery Avenue, London, E.C.1.

HOLLAND.—Chile saltpetre, 15 per cent, about 100,000 kilogs. Particulars from M. van Zoest, Oude Tonge, South Holland.

WANDSWORTH (August 29).—Refined tar. Particulars from D. A. Nicholl, Council House, Wandsworth, London, S.W.18.

WARRINGTON (August 31).—Lime, cement, tar still, glass, oil, paints, sulphuric acid, etc. Particulars from W. S. Haddock, Gas Offices, Warrington.

Sales of Austrian Magnesite

ACCORDING to an American Consular report there is no decrease in the sales of Austrian magnesite, export business showing further increases. An agreement was recently made between the Styrian magnesite shareholding company and a German group which assures to the Germans for a number of years the necessary supplies of magnesite. Last year exports of this mineral increased by 80,000 metric tons and this will probably be exceeded this year. Ninety per cent. of the magnesite production is exported.

Benn Brothers, Ltd. : Annual Meeting

Increased Success due to Management, Enterprise and Work

THE twenty-sixth annual general meeting of Benn Brothers, Ltd. (proprietors of THE CHEMICAL AGE and numerous other trade and technical journals), was held on Friday last at the company's offices, 8, Bouverie Street, London, E.C. Sir ERNEST J. P. BENN, Bt., C.B.E., presided.

Chairman's Review of the Year

Mr. W. R. DUNSTAN (one of the joint secretaries) having read the notice convening the meeting and the report of the auditors,

The CHAIRMAN said:—Gentlemen,—It is my duty and my privilege to endeavour, very inadequately I fear, to fill the place which has been occupied for so many years past by my late father. His annual speech to the shareholders of Benn Brothers, Ltd., his report of the company's operations, and, more important, his masterly summary of the trading position as a whole, have come to be looked upon as one of the regular landmarks in the business year. The great loss which we have sustained in his death is essentially a personal loss, and our hope and belief is that the forty years which he devoted to establishing the spirit of this business, to giving it a character and a purpose of its own, to making the name of Benn a synonym for the best in technical publishing, will have so moulded our habits and our aspirations as to enable us worthily to maintain those great traditions. I speak sincerely for myself and for every colleague in this business in expressing that hope and intention.

Hard Work and Efficiency

The report and accounts which it is my pleasure to lay before you reveal a position which is the strongest in the history of the company. We have had a good year and have done extremely well; we are in a better position than ever; our turnover and our profits continue to advance satisfactorily. The explanation is very simple. It is not to be found in the price of money or the state of trade, or the economic situation, or any of the things now so commonly discussed; it is merely—and I say this advisedly—that we have worked a little harder, that we are more efficient, that we understand a little better the trade to which we are committed, and that our customers are, therefore, able to make an ever-increasing use of the services that we offer. That statement is made by us as a firm and a staff in no egotistical spirit; it explains in our view the real reason of our success.

There is perhaps another and a subsidiary reason. We are publishers, and we stick exclusively to publishing; we believe in the theory of the cobbler and his last, we ask for support on the quality of our products as publishers, we have not found it necessary to go into the insurance business, we offer no premiums, we pay no shopping bills for our subscribers, we merely publish newspapers and books, and devote the whole of our brain power and efforts to making those newspapers and books just as good and serviceable as possible. We avoid "stunts," and our public, which is essentially a serious business public, evidently prefers that attitude.

The Staff as Shareholders

The accounts speak for themselves, and it is unnecessary for me to trouble you with details, but there are one or two matters connected with the policy of the business to which reference should be made. In the first place you will notice that we have again extended the proprietary interest of the staff; the directors are very proud to know that nearly one-fifth of all the people we employ are shareholders in this company. The men and women who carry on the work of the company, the working directors and the staff, own between them nearly half the capital. This is not only a very fine position from Benn Brothers' point of view, but it also constitutes the company a model of the most ideal form of co-operation between employers and employed. Notwithstanding the fact that the company is in no need of new capital, the directors have felt justified in continuing to allot shares at par to senior members of the staff up to a limit of the annual remuneration of each applicant. This simple little plan has added between nine and ten thousand pounds to your capital account in the year under review.

The Success of the Five-day Week

In only one respect are we maintaining, and indeed hope to maintain, a war-time habit. During the war we closed our business on Saturdays, and we continue to do so; it is a very remarkable, and, indeed, I think, a unique thing for a newspaper publishing house to limit its work to five days a week. It causes in sundry little ways sundry little inconveniences, but as against this we believe that it gives us great advantages. We claim that we do more work in five days than most people do in five and a half, we very much enjoy our long week-ends, and the balance-sheet which is before you would seem to prove that no financial disadvantage results from the arrangement. The five-day week movement has not developed as I expected that it would when we were among the pioneers. Some of those who started it have dropped it, but I call attention to its success in our case in the hope that others may be encouraged to try the experiment. The five-day week, if it became general, would, I believe, lead to economy, efficiency, and, most important of all, contentment, and have a happy reaction upon the industrial situation as a whole.

Corporation Tax Must Go

The accounts contain no reference to excess profits duty; you will, I know, be glad to hear that as a result of an investigation into the whole period during which that tax has been operative we have been able to establish our immunity from further liability.

The accounts make provision for fifteen months of income-tax, thus bringing this item up to date for the first time; they also provide for two years' corporation profits tax, which you will remember last year was mentioned in the auditor's certificate. This imposition is still with us, although, surely, it cannot be for long; it is an injustice which must be swept away if trade is ever again to regain its full measure of confidence. I think it is the bounden duty of every company chairman to protest against this corporation profits tax. Notwithstanding all the specious arguments that are advanced by so-called experts and spurious economists, it penalises limited companies as distinguished from every other form of trading organisation. I need not argue with you as to the beneficent effects of the limited liability Acts, or tell you how largely they were responsible for the wonderful expansion of commercial activities in the latter part of the last century and the first few years of this. If we as a nation really desire prosperity, if we are in earnest about providing employment for everybody, if we want our trade and commerce to thrive, then we should surely see that the principle of the joint stock company is fostered and nourished and improved, so that every incentive is offered to suitable persons to join themselves together for industrial purposes. This corporation profits tax is a blow at that great movement and must be brought to an end.

Notwithstanding all the talk of economy, the taxgatherer still takes from your coffers an enormous proportion of your profits, while, if all the money which flows into the Exchequer as a result of our activities, all the taxes paid by our employees, as well as by the company, were added together, it would be found that the State takes nearly twice as much as those who own the business.

Good Trade Prospects

Sir John Benn has once or twice referred to this business as a barometer of commercial conditions. As publishers of trade and technical papers covering a wide range of interest, dealing in various markets, from tomatoes to turbines, we are pretty well able to measure the "ups and downs," and to get a reliable view of the position as a whole. Speaking with a due sense of responsibility from that point of vantage, I confess that I take the most optimistic view of the trading situation. It seems to me that there is every prospect of a steady advance all round; our industries have "touched bottom," and are now "on the mend." The reason is not far to seek; the war is over, but, what is better, the peace is coming to an end. The people are beginning to see that committees and conferences and councils, however supreme, are powerless to house, and feed and clothe them; they are turning very naturally, almost

unconsciously, to the business men, who alone can satisfy any of these needs. As this process develops and extends, so trade will improve, not only here, but in every country in the world. There is no sign anywhere of any "boom," and that should surely be a cause of thankfulness, but everywhere there is an upward tendency.

The relations between capital and labour the world over are better than they have been at any time in the past few generations. There are troubles, of course, and in a progressive world there must always be troubles, but the measure of understanding on both sides is now so full that the risk of serious conflict anywhere is more remote than ever.

The Election Cloud

We in this country have to face the fact that within a year or fifteen months we must have a general election, and that will do no good to trade. It is the only serious cloud that I can discover on the horizon; it is perhaps not too much to ask those who direct these matters that they will be good enough to decide when they want an election and get it over quickly. We traders are entitled, in view of our sacrifices, to be spared any dislocation of business caused by political uncertainty that is not absolutely necessary.

In presenting to you the accounts and report of the best year in the company's history, I do not think that I am overstepping the limits of discretion when I say that your directors have every hope that there will be no going back from the new standard now established for our enterprise.

I have now much pleasure in moving: "That the report of the directors and the accounts and balance-sheet be accepted and approved and that a dividend at the rate of 17½ per cent. per annum, less tax, be paid in respect of the year ended June 30, 1922." (Cheers.)

Mr. H. P. SHAPLAND seconded the motion and it was unanimously adopted.

Election of Officers

On the motion of Mr. E. E. STARKE, seconded by Mr. BILLINGTON, the retiring directors, Mr. F. H. Elliott and Mr. C. E. Hughes, were unanimously re-elected, and on the proposition of Mr. H. B. CROLE-REES, seconded by Mr. ALWYNE MEADE, Messrs. Cassleton, Elliott, and Co. were elected auditors for the ensuing year.

A Happy Augury

Mr. F. E. HAMER then proposed a hearty vote of thanks to the chairman. In doing so, he said that it would be very difficult to propose that vote without recalling the figure of the chairman's father, who for so many years had filled the position which Sir Ernest occupied that day, and whose reputation as a public man, added to his qualities as journalist and a business man, had done so much to give the firm of Benn Brothers the position it held that day, both at home and overseas. (Hear, hear.) He was sure that very high among the satisfactions of the father's life must have been the thought of being succeeded by a son whose self-effacing loyalty had done so much to make the former's public career possible and who might be trusted to safeguard all the principles and characteristics of the firm which Sir John Benn had had so much at heart. (Cheers.) It was a happy augury for the future that Sir Ernest Benn's first annual meeting should declare the largest dividend in the history of the Company.

Mr. P. ROBERTSON seconded the vote and it was unanimously accorded.

A brief acknowledgment by the chairman brought the proceedings to a close.

Safeguarding of Industries Act Complaint

THE Board of Trade have received a formal notice of complaint under Section 1, Sub-section (5), of the Safeguarding of Industries Act, that "Acid acetic, 80 per cent. grade or higher," has been improperly excluded from the lists of articles chargeable with duty under Part I of the Act. The complaint will be submitted in due course to the Referee appointed by the Lord Chancellor for the purposes of the sub-section, and any person directly interested should communicate immediately with the Assistant Secretary, Board of Trade (Industries and Manufactures Department), Great George Street, London, S.W.1.

Success in Dye Manufacture

The Example of Scottish Dyes, Ltd.

IN an interesting review of the essentials of success in dyestuffs manufacture, a special correspondent of the *Manchester Guardian Commercial* expresses the opinion that the British Dyestuffs Corporation, Ltd., is undertaking a great and essential work. The programme it has set before itself involves, he states, the establishment of dyemaking on as large a scale as that of Germany. At one time the British Dyestuffs Corporation or its predecessors were supplying over 80 per cent. of the dyes used in this country. Whatever the faults of the Corporation, it has done good work for the textile industry, and in time will undoubtedly do more. Continuing, the writer says that without an intimate knowledge of its internal affairs it is impossible to say that any company is not doing well so long as the financial results are passable. Whether the Corporation is going to succeed in the shortest possible period is another matter, and one which can be settled only by an intimate inquiry into the company's internal working. He is of the opinion that the company and the textile industry would benefit from a closer system of co-operation, and cites Professor Armstrong's demonstration of the value of the connection in the case of Scottish Dyes, Ltd.

Application of Vat Dyes

After giving an account of the origin of this company, the writer recalls the fact that Mr. Morton was the first manufacturer to issue fabrics with a guarantee against fading from sunlight or washing. When the Germans discovered the vat dyestuffs which give the fast colours necessary for such a guarantee to be substantiated, about 1907, Mr. Morton specialised in their application. The outbreak of war cut him off from supplies more completely, perhaps, than other manufacturers in this country, many of whom were using direct colours as well as and as much as the vat dyes. He met the situation by becoming his own dye-maker. At the end of 1914 he was producing such colours as Indanthrene Yellow G. and Indanthrene Blue, in small quantities and in bulk, early in 1915. By 1917 he had not only succeeded in making several dyes that had hitherto been German secrets, but was marketing previously undiscovered colours. The dye-making department was detached from the parent firm in July, 1917, to be run as a separate concern under the name of Solway Dyes Co. In 1919 this was converted into Scottish Dyes, Ltd., when a works was established at Grangemouth, on the Forth, in addition to that at Carlisle.

The new works are a model for their kind. Their situational advantages are probably unexcelled, combining a pure, smoke-free atmosphere with access to railway, canal (Forth and Clyde), and harbour (Grangemouth). In encouraging contrast to the tradition of chemical works, they are spaciouly planned, and yet retain a due regard for economy of space. The directors have looked far ahead, as well as to immediate efficiency, and the works are designed with a view to extensions so that the further success of the company will not involve expensive alterations.

Anthracene Colours

The story of Scottish Dyes, the writer adds, is proof enough that dye-making is not necessarily indigenous to the banks of the Rhine, and that it can be carried on efficiently in this country. To those who say that British dyers cannot afford to use British dyes, the firm replies that Morton's Sundour Fabrics use their products almost exclusively, purchasing them at the ordinary market price, and that the present sales of these fabrics are three times what they were in pre-war days. Having specialised in vat colours, and mainly in those produced from anthracene, the range of colours produced by Scottish Dyes is not, of course, so great as the more ambitious programme of the British Dyestuffs Corporation, but in its own sphere the Scottish company can challenge competition. The greens which it issued last year were, he states, a triumph for British chemistry, which forestalled in this the larger experience of the German firms. In conclusion, the writer says the key to the success of Scottish Dyes is undoubtedly the close relationship that it has with the textile industry in the person of Mr. Morton, who is weaver, dyer and dye-maker. This knowledge has enabled him to carry on in the teeth of a fierce foreign opposition, and at a time when many people doubt whether dye-making can ever become a home industry.

Brewing Research Scheme

Report on the Year's Work

THE Institute of Brewing have issued a report on the research work of the Institute from May, 1921, to March last. It deals with manurial experiments on plots of land at Chilham and Horsmonden, and detailed results are given of crops obtained on unmanured plots, and plots treated with varying quantities of sulphate of ammonia, superphosphate, potassium sulphate, and farmyard manure.

The report describes the construction of experimental kilns at Beltring, Kent. On the cooling floor of the installation is a small laboratory containing a balance, weighing to $\frac{1}{10}$ th mgm., a steam oven, desiccators, etc., used for determinations of the moisture content of hops at various stages. Long, flexible stemmed mercurial thermometers are employed for taking the temperature at the bottom and surface of the layer of hops; the stems are 25 ft. long.

This experimental oast is an apparatus designed to study the conditions affecting hop drying and is not intended to be a model commercial plant in any way. The object of its design is to keep the various factors concerned in the process of drying under strict control, with a view, if possible, to ascertain the ideal conditions of drying. Twenty-two kiln loads were dried during the season, the moisture content of the hops being estimated before treatment and again immediately after removal from the kilns. It was found that the kilns worked satisfactorily and that the drying conditions were well under control. The air current can be varied through a very wide range. It is also possible to raise the temperature to 212° F., with an air current of 300 cubic feet per minute.

The factors dealt with during the season were air supply and temperature. Two series were dried at varying temperatures (104° F. to 194° F.) with a constant air current of 300 cubic feet per minute. Three series were dried at constant temperatures (two at 140° F. and one at 167° F.) with varying air currents (100 to 800 cubic feet per minute).

Half a pound of sulphur was burned in each kiln, below the hops, immediately after loading. Each kiln load of hops was weighed before and after drying. The total weight of green hops used was 1,106 lb. 8 oz., and the weight after drying was 284 lb. 10 oz., a loss of 74.27 per cent. Each kiln load was packed in a separate small pocket. The resins, in samples drawn from these pockets, are being estimated with a view to finding the effect of drying temperature and air supply on these substances.

Chemical Investigations

Chemical investigations are being carried out by Dr. F. L. Pyman in the College of Technology, Manchester, with the object of isolating and determining the constituent or constituents of the hop on which the antiseptic or preservative qualities depend. A study of the available literature on the subject and the fact that the soft resin-content of a hop is regarded in some measure as an index of its preservative properties have led him to investigate, in the first place, the light petroleum extract of hops. The hops employed in this investigation were Canterbury Goldings, dried by Mr. F. Neame, of Faversham. An examination has also been made of the ether extract of the mass remaining after the petroleum extraction of the hops, and this preliminary examination has revealed the fact that it is possible to subdivide it into characteristic fractions, and a larger quantity of ethereal extract has been prepared for a further study. The results so far obtained, although merely preliminary, show the extraordinary complexity of the subject with which Dr. Pyman and his assistant, Dr. T. K. Walker, are dealing.

Chemical Side of Timber Research

The chemical side of these investigations has, owing to the almost complete lack of knowledge of the chemistry of timber, necessarily proceeded somewhat slowly, and, furthermore, a considerable amount of work of a survey character had first to be accomplished. During the past year, the chemical part of the work has been confined to the various oaks which have been employed in cask-making, but it is also applicable to other kinds of timber, as the general chemical methods have been worked out in the course of the researches.

It has been found that the timbers which have proved satisfactory for brewers' casks generally contain a larger

amount of substances which can be extracted with alkali than those which have proved to be unsatisfactory, and these investigations are now being continued with a view to determine how far the various methods of treating casks in the brewery are influenced by this factor. It is hoped that investigations on these lines may lead to results which can be applied in brewery practice. A questionnaire has been issued to representative firms inviting them to supply Professor Schryver, who is directing the chemical side of these investigations, with information as to their methods (if any) of treating their casks before filling them.

In regard to physical and analytical valuations of the barleys and malts made therefrom, the report states that the valuations will proceed along the following lines: (1) empirical valuations of the barleys; (2) determinations of nitrogen, moisture, and possibly diastase and extracts; (3) determination of 1,000 corn weight, as a rough test of size; (4) Blaber cupboard process of malting applied to the full range of samples; and (5) full analysis of the resulting malt samples, determining diastase, tint, extract (crushed and ground), ready formed soluble carbohydrates, soluble uncoagulable albumenoids (proteins), water, together with a detailed physical and analytical report.

New Zealand Fertiliser Imports

REPORTING on the imports of fertilisers into New Zealand during the year ended March 31 last, the New Zealand Government Chemist-in-Chief states that the quantities imported totalled 72,300 tons, as compared with 142,357 tons for 1921. This wide difference in importations is no doubt due to limited purchasing power of farmers, combined with heavy holdings of certain fertilisers in the country at the beginning of the year under review. There is, he states, no reduction in the need for fertilisers in New Zealand; on the contrary, great as is the producing capacity of New Zealand, continuous cropping and grazing and the need for intense cultivation call for an increasing importation of all fertilising agents. The quantities imported in 1921-2 and the price per ton are given as follows:

	Tons.	Price.		
		£	s.	d.
Bone-dust	4,063	11	11	3
Bone char	594	—	—	—
Blood and bone	50	—	—	—
Basic slag	13,488	6	3	10
Superphosphates	3,140	6	19	6
Guano and rock phosphate	45,956	2	5	0.
Potash	2,420	—	—	—
Gypsum	301	—	—	—
Sulphate of ammonia	2,058	14	0	4
Sulphate of iron	26	—	—	—
Nitrate of soda	204	19	4	4
	72,300			

Basic slag imports showed an increase of 2,665 tons over the previous year, but superphosphate declined from 40,731 tons imported in 1921 to 3,140 tons this year, due to large holdings in the Dominion and to the growing outputs of New Zealand chemical works.

The rock phosphate was imported from the Pacific deposits at New Caledonia, Makatea, Ocean and Nauru Islands. India is the main source of supply of bone-dust and Australia of blood and bone, but the New Zealand freezing works can supply practically all of this required. Belgium was the principal supplier of basic slag and France of the potash.

Radio-Active Minerals in Italy

A BILL for the utilisation of minerals with radio-active properties has recently been presented to the Italian Chamber of Deputies. The report accompanying the Bill says that it is hoped to utilise as radio-active materials the mud deposits of Abano, and the resources of the Island of Ischia. So far, states the Milan correspondent of the *Times*, the only important discovery seems to be that of a mineral called autunite in a cave near Lurisia, in the province of Cuneo. Mme. Curie is of the opinion that this mineral has radio-active properties superior to the minerals of America and Portugal, and only inferior to those of Bohemia. The Italian Government is negotiating with Germany for the acquisition of 44 milligrams of radium on account of reparations.

Scarab Oil Burning Co.

New Uses for the Company's Process

PRESIDING at the second annual meeting of the Scarab Oil Burning Co., Ltd., held on August 10 at 65, Bishopsgate, London, Mr. T. M. C. Steuart (chairman) said that owing to the falling off in the home trade during the early months of the year they had naturally looked elsewhere for business. With the opening up of oil properties in South America and the rapid developments which were taking place there in the use of fuel oil on the railways and in factories, they were giving special attention to this market. They were developing their business in other foreign countries also, and believed there was a substantial business on the Continent as soon as the exchanges returned to a more normal condition. They believed that in the Scarab burner they had the most efficient of all the oil burners at present on the market, and they continued to receive the most satisfactory reports as to its efficiency. As one instance out of many, he might refer to the highly satisfactory results it had given in breweries, where cleanliness was absolutely essential. They were also devoting their attention to the question of central heating. They believed this would yield a large field for the employment of oil burners; they would not only be cleanly and labour-saving, but would also abate to a considerable extent the smoke nuisance to which public attention was being called. The company had also completed its new equipment for use by small plants. This equipment, which was the only one of its kind, was self-starting and self-operating; it could now be fairly said to have passed the experimental stage, and steps were being taken to place it on the market.

The Calorising Process

Continuing, Mr. Steuart referred to another branch of the business which had been occupying a good deal of their time; this had been the calorising process, the British and certain foreign rights of which the company had acquired. The calorising process (see *THE CHEMICAL AGE*, Vol. VII., p. 120) was for the treatment of metals which in use would become exposed to very high temperatures, and the trials which they had made with the process had shown most astonishing results. The costs of the process was not excessive having regard to the saving effected by reason of the greatly increased length of life of the metal calorised. The furnaces and works necessary had been erected, and the business was now starting actively. They had a considerable number of orders and inquiries to deal with, including trial orders from railway companies and large industrial concerns, and they were looking forward to a substantial development in this branch of their enterprise.

Sulphate of Ammonia

New Autumn Price List

THE British Sulphate of Ammonia Federation have issued the following circular to their customers:—

"We are pleased to be able to inform you that we have received an excellent response to our circular 1/23, and have booked orders for a very substantial quantity for July/August delivery. We now offer to sell sulphate of ammonia for home agricultural use at the following price:—*For September and October delivery, 1922, £16 8s. per ton for neutral quality in fine friable condition, free from lumps, basis 25½ per cent. ammonia.* Delivered to consumer's nearest station or wharf in Great Britain, for prompt cash payment, in lots of 4 tons and upwards. Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above prices, basis 25½ per cent. ammonia. All other terms and conditions as per Circular 1/23. *Orders should be sent to us immediately, and will be dealt with in rotation.*

"We wish to draw your attention to the fact that, owing to the coal strike in America, the world's supply of sulphate of ammonia will probably be curtailed to an even greater extent than we thought likely two months ago. We take the opportunity of reminding you that when the price of nitrate of soda is £12, sulphate of ammonia is worth £16 5s. per ton; when nitrate of soda is £12 10s., sulphate of ammonia is worth £16 18s. 6d.; and when nitrate of soda is £13, sulphate of ammonia is worth £17 12s. per ton."

Empire Patent Rights

The Protection of Inventors

THE report of the conference of representatives of the Patent Offices of the Dominions, which was held in London recently to consider the practicability of instituting a system of granting patents which should be valid throughout the British Empire, has been issued by H.M. Stationery Office (1s. 1d. post free). It is pointed out in the report that to obtain protection throughout the Empire requires numerous applications at considerable expense, and the fees for maintenance are very onerous in many of the Colonies and Protectorates. While the chief principles of patent law are substantially the same, there is considerable divergence of practice and procedure, and there is no certainty that an invention for which a patent has been secured in any part of his Majesty's Dominions will necessarily receive the same protection in any other part of those Dominions. The conference recognised, however, that the specifications forming the search material in the United Kingdom would undoubtedly include a large majority of the more important inventions patented not only in the British Empire, but throughout the world, and consequently the patent issued by the United Kingdom Patent Office would have relatively a high value.

A Central Patent Office

The scheme which the conference adopted includes the following provisions: (1) Existing rights of the United Kingdom, the self-governing Dominions, and India, to grant patents in accordance with their laws and within their own territories, to be maintained in full. (2) The establishment of a Central Patent Office for the reception and examination of applications for, and the grant of, patents which shall extend to the United Kingdom, or to any of the self-governing Dominions, or to India, upon registration in the particular territory in which protection is desired. The application for registration to be open to opposition before registration is actually effected. (3) The Central Patent Office, in examining applications submitted to it, to make a search co-extensive with the field at present covered by the searches now made in the United Kingdom, the self-governing Dominions, and India collectively. (4) The scheme suggested above to be equally applicable to all the Colonies and Protectorates, subject to the qualification that the application for registration shall not be open to opposition unless the existing law makes provision for the hearing of opposition to the grant of patents, but in any case the local Courts to be empowered to declare that an exclusive privilege has not been secured in the territories within their jurisdiction. (5) The fees for registration to be of such amount as would result in a considerable reduction in the total cost of obtaining patents throughout the Empire at the present time.

A Uniform System

Among the advantages of the scheme, it is pointed out, is that one application and one specification only will be necessary for obtaining the grant of a patent throughout the British Empire. There will be one examination in respect of formalities, the sufficiency of the documents, and the novelty of the invention, and consequently after the application in the Central Office has been accepted there will be less uncertainty as to the fate of the application throughout the British Empire. There will, in consequence, be a very great diminution of expense, both in regard to the preparation, supply, and printing of documents and as a result of the abolition of the local examination on each application. A patent so granted and registered will have a considerably greater commercial value than any individual patent at present issued in the British Empire, by reason of the wider search which will be made in the Central Office.

While the conference accepted the scheme described above as the scheme which would have the greatest chance of success and acceptance throughout the Empire, the delegates felt that, in view of the difficulty of equipping a Central Office with all the necessary material for the extended examination and of the time and expense which would necessarily be involved, it would be desirable to consider the possibility of some provisional scheme, which might be put into force until such time as the "preferred" scheme became capable of realisation.

From Week to Week

The offices of Mr. N. P. H. STEWART, chemical merchant, are now at Baltic Chambers, 50, Wellington Street, Glasgow.

A. E. NEWTON, LTD., oil and grease manufacturers, announce the removal of their offices to Connaught Mansions, 34, Victoria Street, London.

MR. STEWART JONES, of Brunner, Mond and Co. (China), Ltd., and Mr. J. Quin, of Lever Brothers, Ltd., recently left Shanghai for England by the *Empress of Japan*.

MR. C. C. LEACH has been re-elected president of the North of England Institute of Mining and Mechanical Engineers, and Professor Henry Lewis, honorary secretary.

The Norwegian Director of the Civil Medical Board has circulated a statement to the effect that SYNTHETIC CAMPHOR is now competing seriously with Japanese camphor.

MR. A. C. WHITNEY, chief chemist to Goodall, Clayton and Co., Ltd., Leeds, has sailed for India to take up an appointment as works manager to Carbon Products, Ltd., Bombay.

A CRICKET MATCH at Crouch End, London, on August 5, between elevens representing British Drug Houses, Ltd., and Allen and Hanburys, Ltd., resulted in a win for the latter team.

The death occurred at Byfleet, recently, of Mr. T. D. Conway, a director of Stevenson and Howell, Ltd., manufacturing chemists, Standard Works, Southwark Street, London.

The annual excursion of B. HEPWORTH AND CO., LTD., chemical manufacturers, Kidderminster, took place last week, when a large party of the employees, accompanied by the directors, visited Evesham.

It is reported from Amsterdam that the Amsterdam and Netherlands Rubber Co. have sold the forward part of their 1923, 1924 and 1925 RUBBER CROPS to the General Rubber Co., of New York, at a minimum price of 8d. per lb.

The post of LECTURER IN PHYSICS at the University of Capetown, is now vacant. The Secretary, Office of the High Commissioner for the Union of South Africa, Trafalgar Square, London, will supply particulars of the appointment.

The annual report of CENTRIFUGAL SEPARATORS, LTD., states that with regard to the numerous industries which have yet to be educated in the use of the separators, the directors believe that there are many in which the machines can profitably be used.

It is reported that the GESELLSCHAFT FÜR CHEMISCHE INDUSTRIE in Basle, in conjunction with the Société des Usines Girondo de Lyons has acquired the Société Chimique des Usines du Rhône at Saint Fons, near Lyons. The purchase price is said to be approximately 800,000 francs.

Considerable opposition is being offered in the Chilean Press to the German restrictions on the IMPORTATION OF SALTPETRE. It is rumoured that preparations are being made to introduce a Bill prohibiting the importation of goods from any country where the importation of saltpetre is restricted.

Mr. Malan, the Minister of Mines for South Africa, who visited the Belgian Congo recently, is reported to have been favourably impressed by the mineral possibilities of the Katanga. He has estimated that these mines have a COPPER CARBONATE ORE varying from 20 to 40 per cent.

What is claimed to be the largest single contract ever made in the history of the WOOD-PULP INDUSTRY has just been negotiated between Becker and Co., Ltd., and Canadian interests. It is understood that 1,000,000 tons of mechanical wood pulp and 600,000 tons of sulphite are involved.

AN IMPORTANT AMENDMENT giving the President of the U.S.A. power to modify very considerably the Tariff Bill which is now before Congress has passed the Senate. It provides that the President in his discretion may raise or lower by fifty per cent. any duties fixed by the measure in its final form.

News has been received in Southport that MR. EDWARD ARTHUR REYNOLDS, son of Mr. F. T. Reynolds, director of Milwards Merchandise, Ltd., Blackfriars Street, Manchester, and chairman of the Executive Council of the Chemical and Dyestuffs Traders' Association, has been accidentally drowned whilst bathing at Salmon Arm, British Columbia.

Speaking on Wednesday at the annual meeting of the Argentine Oilfields, Ltd., Mr. C. M. Hunter described the IMPORTANT OIL DEVELOPMENTS which had recently taken place in the Argentine, with special reference to the Neuquen

district. He referred to the very large area acquired, and felt confident of successful results being obtained in portions at least of this area.

DR. CHARLES CARPENTER, president of the South Metropolitan Gas Co., whose services to chemical industry were outlined in THE CHEMICAL AGE recently, forms the subject of the latest article in the *Financier* series on "Men of Mark in Business." Prominence is naturally given to his work in connection with the formation of the Association of British Chemical Manufacturers.

According to an Exchange message from Washington, the AMERICAN PRODUCTION OF DYES in 1921 totalled 39,000,000 lb., a decrease of 56 per cent. from 1920. The decrease is attributed to loss of export trade, the large stocks held from the previous year, and the general business depression. The imports of dyes represented 10 per cent. of the domestic production. Exports of domestic dyes decreased 79 per cent. over the previous year.

According to a Department of Overseas Trade Report, investigations of the reported DEPOSITS OF SULPHUR at Dieng, in the Residency of Kedoe, Java, have resulted in the discovery of layers averaging 3 metres thick containing about 50 per cent. pure sulphur, at a depth of from 15 to 20 metres. It is estimated that this deposit contains about 200,000 tons. A mud lake near Bandoeng has also been found to be rich in sulphur of about 6 per cent. purity and it is estimated that there is sufficient mud to yield over 500,000 tons.

MR. O. P. HOOD, chief mechanical engineer of the Bureau of Mines, sailed for London on July 12. Mr. Hood will spend three months in Europe, studying new developments in lignite utilisation and the low-temperature carbonisation of coal, for the purpose of applying the information to studies in lignite and fuel utilisation now being conducted under his direction in the United States by the Bureau of Mines. Mr. Hood will visit England, Germany, Switzerland, Belgium, Holland, Jugo-Slavia, Czecho-Slovakia, Austria, Italy and France.

THE MARRIAGE was solemnised on Tuesday, at the Parish Church, Fairlie, Ayrshire, between Professor Walter Norman Haworth, Professor of Organic Chemistry and Director of the Chemical Laboratories, Armstrong College, Newcastle-on-Tyne, and Violet Chilton, second daughter of Sir James and Lady Dobbie, of Fairlie Cottage, Fairlie. The Rev. A. Allan officiated, and Mr. James C. Dobbie was best man. After a reception held at Fairlie Cottage, at which the guests included Mr. and Mrs. James Tennant, the bride and bridegroom left for Italy and Switzerland.

The Electrolytic Zinc Co., which has established large works at Hobart for the production of spelter from New South Wales ores, and some time ago took over the Read-Rosebery group of zinc-lead mines on the West Coast of Tasmania, has, it is reported, evolved satisfactory methods of TREATMENT OF THE DENSE SULPHIDES which for so long have baffled the metallurgical chemist. It is also stated that the Tasmanian zinc and lead sulphides used in conjunction with the Broken Hill (N.S.W.) ores will give a better return than either of the ores would separately. The successful treatment of the complex West Coast ores is of considerable importance to the Tasmanian mining industry.

In response to requests for information regarding the status of the SULPHUR DIOXIDE LEACHING PROCESS, developed at the South-west experiment station of the U.S.A. Bureau of Mines, Tucson, Ariz., Serial 2350, by C. E. Van Barneveld, supervising mining engineer, and E. S. Leaver, metallurgist, has been issued. The advantages claimed for the process are that the plant is compact and inexpensive, with no particular installation difficulties and with light power requirements. The operation of the plant is simple, and easily controlled; there are no delicate adjustments or critical points. Percolation difficulties common to leaching are entirely avoided. Perfect contact is assured between finest ore particles and reagent. The reagent is very cheap and excellent utilisation is attained; the process may be extended to ores having a much higher acid-soluble gangue content than could be considered in ordinary sulphuric acid leaching practice. The process is applicable alike to large operations and to relatively small operations without undue increase in operating cost for the smaller installations. Copies of the pamphlet may be obtained from the Bureau of Mines, Washington, D.C.

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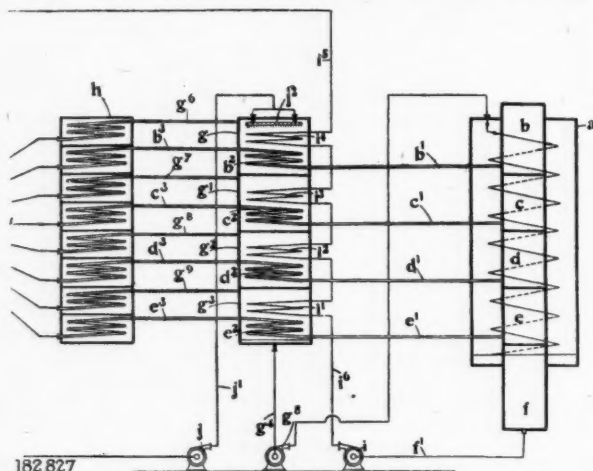
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Abstracts of Complete Specifications

182,827-8. CRUDE OIL AND OTHER LIQUIDS, FRACTIONAL DISTILLATION OF. P. Mather, 23, Great Winchester Street, London, E.C. Application date, January 11, 1921.

182,827. The apparatus is particularly for the fractional distillation of oils rich in benzene and kerosene, and the heat of the hot vapour fractions and the hot liquid residue of distillation is made use of in a series of heat exchangers. A cylindrical still *a* is provided with a central outlet tube divided into a number of compartments *b, c, d, e*, from which the vapour fractions pass through pipes *b¹, c¹, d¹, e¹*, and heat is applied to the casing of the still in a series of corresponding



temperature zones, the temperature increasing from *b* towards *e*. The vapour fractions pass through pipe coils *b², c², d², e²*, in the lower parts of heat exchangers *g, g¹, g², g³*, and any uncondensed vapour passes through pipes *b³, c³, d³, e³*, into the respective compartments of a water cooled condenser *h*. The hot residue passes from the still through a pipe *f¹* to a pump *i*, and thence through evaporator coils *i¹, i², i³, i⁴*, in the respective compartments of the heat exchanger. The crude oil is delivered by a pump *j* through a pipe *j¹* to a sprayer *j²*, which delivers it over the pipe coils *i¹, i², etc.*, and the heated oil passes out through the pipe *g¹* and is delivered by a pump *g²* to the still *a*. The first fractions are thus distilled from the crude oil before entering the still, and the vapour generated passes through outlet pipes *g⁵, g⁴, g³, g²* to the condenser *h*.

182,828. The heat exchangers for use in the apparatus described in specification No. 182,827 above consist of superposed series of horizontal evaporator tube sets which are connected to vertical columns or headers in such a manner that the hot fluid circulates through the tube sets as in a coil. The construction of the apparatus is described in detail.

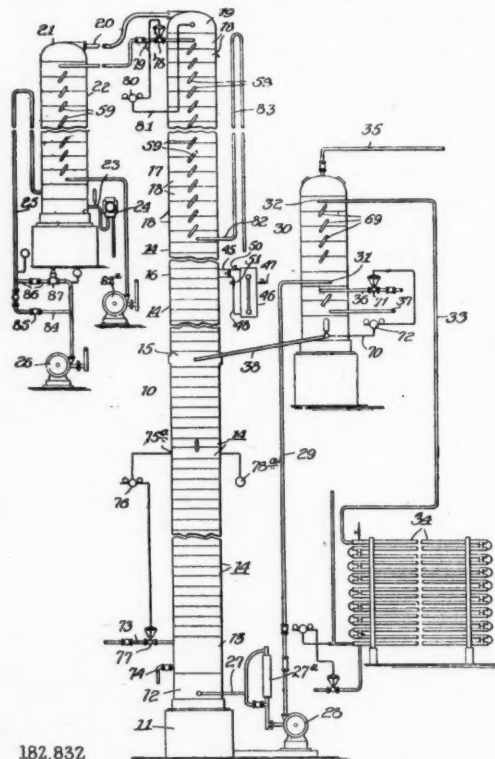
182,830. CELLULOSE ACETATE OR PRODUCTS MADE THERE WITH, TREATMENT OF. R. Clavel, Basel-Augst, Switzerland. Application dates, January 12, and August 30, 1921.

Cellulose acetate and products made from it, such as artificial silk or films, have not been considered capable of being dyed by ordinary processes, due to the water resisting properties of the acetate, and to avoid this difficulty the cellulose acetate has been partly saponified or treated with alkalis or other compounds to render it receptive to the dye. It is now found that certain classes of dyestuffs are capable of entering into chemical reaction with the cellulose acetate and of dyeing it. These dyestuffs may be soluble or insoluble and must contain one or more active groups, viz., hydroxyl groups, amino groups, imino groups, imide groups, nitro groups, nitroso groups, isonitroso groups, acidyl-amino groups, or azo groups. These dyestuffs must not contain any sulpho

group, or if one sulpho group is present two or more of the active groups must be present. The cellulose acetate product must have been prepared by processes in which depolymerisation of the cellulose molecule has been avoided as much as possible. If basic dyes containing no sulpho group, or one sulpho group with more than one active group, be used, they are preferably employed in conjunction with salts such as magnesium, stannous or zinc chloride, which are capable of forming double salts with the dyestuff. Examples are given of monoazo dyestuffs, disazo dyestuffs, triphenylmethane dyestuffs, phthalein dyestuffs, azines, oxyketones, vat dyestuffs of the anthracene series, and of the indigo group, and natural organic dyestuffs, which are suitable for this process. Reference is directed in pursuance of section 8, subsection 2 of the Patents and Designs Acts of 1907 and 1919, to Specification 176,535.

182,832. ALCOHOLIC AND OTHER LIQUIDS, PROCESS OF DISTILLING. H. Wade, London. From J. Schneible 130, North Wells Street, Chicago, U.S.A. Application date, January 13, 1921.

A column still comprises a collecting chamber 12 surmounted by a number of superposed units 14 forming a distilling and dephlegmating column. A reflux condensing column 17 formed of units 18 surmounts the dephlegmating column. The liquid to be distilled is fed into the still at an intermediate point 15, and vapour passes out through the pipe 20 to a condenser 22. The condensate passes through the pipe 23, and uncondensed vapour through the pipe 25 to a pump 26. The residue from the still passes through a pipe 27, cooler 27A, pump 28, and pipe 29 to a preheater 30 at an intermediate



point 31. The hot liquid passes up through the preheater coils to a discharge pipe 33 and cooler 34, while the liquid to be treated is passed in counter current to preheat it, and thence by the pipe 38 to the still at 15. The point 15 at which the fresh liquid is admitted is selected so that the liquid condensate has substantially the same proportion of alcohol or the like as the fresh liquid. The temperature of the vapour

run off at the top is controlled by the cooling water in the reflux condenser. The heat supply to the still is controlled to produce a constant temperature in the column above the still, so that a uniform temperature gradient is obtained in the column. The liquid is withdrawn from the still at its boiling point.

182,843. HYDROCARBONS, OXIDATION OF. F. W. Attack, of The British Alizarine Co., Ltd., Trafford Park, Manchester. Application date, February 9, 1921.

The process is for oxidising aromatic hydrocarbons in the vapour phase, particularly naphthalene, to phthalic acid and anthracene to anthraquinone. The vapour is preferably mixed with steam or other inert gas and passed over a catalyst consisting of titanium oxide or other titanium compound. Oxidation is assisted by the addition of oxygen or oxides of nitrogen. In the case of anthracene the temperature required is about 450° C.

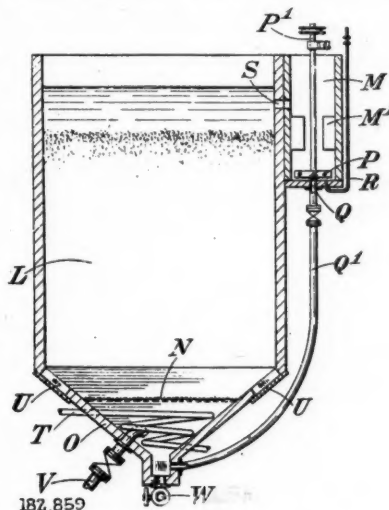
182,852. HYDROCARBONS, PROCESS AND APPARATUS FOR THE MANUFACTURE OF, FROM CARBONACEOUS SUBSTANCES SUCH AS COAL OR DISTILLATION PRODUCTS THEREOF. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, London, S.W.1. Application date, March 5, 1921.

In this process coal, oil, tars, etc., are treated with water or reducing agents such as hydrogen at pressures of 50 atmospheres or over, and at high temperatures to produce hydrogenation products. The apparatus shown is adapted for the hydrogenation of tar oils. The oil, which may be mixed with aqueous alkali solution, is drawn from a container *b* and forced by a pump *c* into a reaction pipe *i* of nickel. Compressed hydrogen is supplied from a container *f* or a two-stage compressor *d*, *e* to the pipe *i*, and the mixture is heated to 400°–550° C. The pressure is maintained at about 120 atmospheres, a relief valve *6* being set to this pressure. Heating is effected by a producer or a generator furnace *9*, and the hot gases pass through a jacket *7* in a spiral path to heat the reaction tube *i*. The products pass continuously into an expansion vessel *j* provided with a cooling jacket, in which hydrocarbons boiling at 200° C. are condensed. The pressure and temperature are regulated independently, and are correlated, so that when one rises the other falls. The lower boiling hydrocarbons are recovered in condensers *o*, *q*, *s*, and receptacles *p*, *r*, *t*, while the lightest products are condensed in a cooling coil *u*. The carbon dioxide is absorbed by alkali in a vessel *z*, and hydrogen and methane are dried by calcium chloride in a tower *18*. The gas then passes back to the compressor *d*, *e*. Detailed examples are given of the treatment of finely divided brown coal suspended in tar oil, heavy oil, pitch residue, tar and mineral oils. The yield of low boiling and other hydrocarbons amounts to 60 per cent. of the brown coal and 80–84 per cent. of the tar oil. A yield of 50 per cent. of products boiling below 200° C. may be obtained from heavy oil. It is found that the hydrogenation is accelerated by the addition of alkali.

182,859. CALICHE, TREATMENT OF. W. Broadbridge, 62, London Wall, London, E.C.2, E. Edser, 3, Hillyfields Crescent, Brockley, London, S.E.4, and W. G. Sellers, 2, King John's Court, London, E.C.2. Application dates, March 9 and September 6, 1921.

In the usual process for treating caliche it is found that if the raw material is finely crushed before extraction of the nitrate, slimes are produced which do not readily settle and cannot be economically removed by filtering. In the present invention it is found that when a strong solution of sodium nitrate containing slimes is agitated and aerated, the slimes become flocculated and may be deposited on a filter bed such as the undissolved residues of the caliche. Each extraction unit comprises a tank *L* and an agitation vessel *M* connected to it. This vessel contains vertical baffles *M*¹ and a horizontal impeller *P* at the bottom. The circulating liquor from the tank *L* is drawn upwards through a pipe *Q*¹, agitated by the impeller *P*, and aerated by air drawn in through the pipe *R*. The liquid is delivered back to the tank *L* through the passage *S*. The caliche rests on a false bottom *N* and nearly fills the tank *L*, while the solvent liquid is heated by steam coils *T*. Undissolved caliche residues are removed through a door *U*,

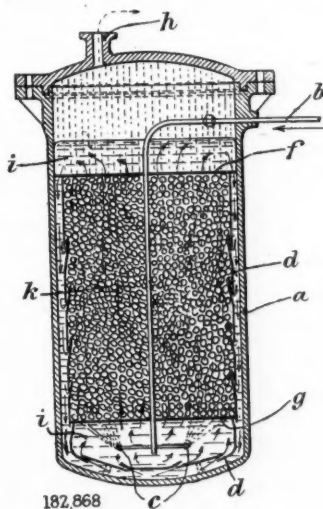
and the strong liquor is drawn off through an outlet *V*. To assist in the flocculation of the slimes, oil may be added in the proportion of 1.5 lb. per ton of the finished nitrate. It is found that the slime is retained by the solid material in the tank *L*, and a clear solution of sodium nitrate may be drawn off. The caliche treated may be crushed to about half inch



mesh for the treatment as above, or the fines may be separated from the coarser particles and treated by a froth flotation process to remove the slimes.

182,868. TARS AND OILS, PROCESS AND APPARATUS FOR THE DISTILLATION OF. E. Blumner, Duisburgerstrasse 6, Berlin. Application date, March 29, 1921.

Liquids, such as tars and oils, are continuously distilled by passing them in a finely divided condition through molten metal heated to about 400°–500° C. in an autoclave at a pressure of about 60 atmospheres. Evaporation is avoided in the autoclave, and the liquid is evaporated and fractionated outside the autoclave by reducing the pressure. The autoclave *a* is provided with an inner cylinder of sheet metal *d* having a perforated false bottom *g* and a perforated cover *f*. The space within the cylinder is filled with material such as "raschig"



rings. The molten metal, which may be tin or one of its alloys, fills the autoclave above the cover *f*. If metals such as lead or zinc are present in the molten metal, sulphur compounds in the tar are extracted in the form of sulphides. The liquid to be treated is injected through the pipe *b* and jet nozzle *c* into the space below the perforated plate *g*, and the finely

divided liquid passes upwards through the molten metal. The liquid does not come into contact with the heated walls of the autoclave, so that overheating is avoided, but the metal circulates downwards in contact with the heated walls. The treated liquid passes out through the opening *b* and is subjected to fractionation, after reduction of pressure to generate vapour and condensation of such vapour. Reference is directed in pursuance of Section 7, sub-section 4 of the Patents and Designs Acts 1907 and 1919, to Specifications 8336/1909, 116,304 and 141,223.

182,869. FATTY OILS, GUMS, RESINS, AND OTHER ORGANIC MATERIALS, PROCESSES AND APPARATUS FOR TREATING THE VAPOURS AND GASES FORMED BY HEATING. P. W. Webster, 1,469, Roosevelt Avenue, Pelham Manor, N.Y., U.S.A. Application date, March 30, 1921.

The object is to treat the fumes generated during the heating or boiling of drying oils, such as linseed oil, tung oil, china wood oil, soya bean oil, and various types of gums and resins, more particularly in the manufacture of varnishes, paints and lacquers. Air is admitted in controlled quantity to the vessel in which the oil is being treated so as to oxidise the fumes, and the gases and vapours thus produced are passed in succession through a surface condenser, then through a water scrubber to recover the condensable products, and finally through an alkaline solution to react with the remaining uncondensed fumes.

182,886. PHENOL AND FORMALDEHYDE PROCESS FOR THE MANUFACTURE OF INSOLUBLE CONDENSATION PRODUCTS FROM. F. B. Dehn, London. From S. Satow, Tokio, Japan. Application date, April 6, 1921.

The object is to avoid the use of high pressure usually necessary in making phenol-formaldehyde products, and to obtain a more elastic product. The liquid condensation product first produced from phenol and formaldehyde with a small quantity of sodium sulphite, is treated with about 5 per cent. of an oxy fatty acid, such as glycolic acid, lactic acid, malic acid, tartaric acid, or citric acid, or alcohols such as glycerol, butyl, amyl, ceryl, cetyl, myricyl alcohol, and cholesterol, or glucose, levulose, mannose, maltose, etc., yielding the desired product.

182,927. CALCIUM HYPOCHLORITE, PROCESS FOR THE PRODUCTION OF STABLE COMPOUNDS OF. Chemische Fabrik Griesheim-Elektron, 51, Gutleutstrasse, Frankfurt-on-Main, Germany, H. S. Schultze, 11, Marien-Anlage, Griesheim-on-Main, Germany, G. Pistor, 104, Ignaz-Stroof-Strasse, Griesheim-on-Main, Germany, and H. Reitz, 7, Mittelstrasse, Bitterfeld, Germany. Application date, April 13, 1921.

The process is for producing a bleaching and disinfecting compound which is more stable than chloride of lime. It is found that the principal cause of the instability is the presence of calcium chloride, and that when this is removed the basic hypochlorite remaining retains most of its available chlorine. In an example, milk of lime is chlorinated by passing 100 parts of chlorine into 475 parts of lime sludge containing about 30 per cent. of CaO. The basic calcium hypochlorite crystallises out and is filtered and dried. It contains 42 per cent. of available chlorine. The process may be carried out in two stages by chlorinating milk of lime and then adding a further quantity of milk of lime. The crystals of basic hypochlorite are dried at 110° C., either *in vacuo* or at ordinary pressure.

183,089. SULPHATE OF AMMONIA, NEUTRALISATION AND DRYING OF. G. Weyman, The Cwm, Saltwell Road, Low Fell, Gateshead-on-Tyne. Application date, December 1, 1921.

Crystallised sulphate of ammonia manufactured in the usual manner is treated in a centrifugal machine to dry it, and after the greater part of the mother liquor is removed, the crystals are neutralised with finely divided ammonium carbonate which is blown into the crystals in the centrifuge. The neutralisation is completed after the discharge of the hot salt by the continued decomposition of the ammonium carbonate.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :

157,281 (A. Helbronner and P. Pipereaut) relating to sulphuric acid, see Vol. IV., p. 405; 157,318 (G. Polysius) relating to low-temperature carbonisation, see Vol. IV., p. 405; 157,978 (E. Hopkinson), relating to treating rubber latex, see Vol. IV., p. 457; 158,512 (Elektrochemische Werke Ges., H. Bosshard, and D. Strauss) relating to sulphonated condensation products, see Vol. IV., p. 483; 161,165 (V. M. Goldschmidt) relating to magnesium chloride, see Vol. IV., p. 654; 161,976 (Koppers Co.) relating to purification of phenol-contaminated liquors, see Vol. IV., p. 703; 167,469 (Hooker Electro-Chemical Co.) relating to electrolysis, see Vol. V., p. 437; 171,956 (Elektrochemische Werke Ges., H. Bosshard and D. Strauss) relating to a condensation product from naphthalene and glycolic acid, see Vol. VI., p. 116.

International Specifications not yet Accepted

181,326. HYDROGEN AND CARBON MONOXIDE. (Norsk Hydro-Elektrisk Kvaelfstofaktieselskab, 7, Solligatan, Christiania. International Convention date, June 7, 1921. Addition to 176,779 (see THE CHEMICAL AGE, Vol. VI., p. 636).

Specification 176,779 describes a process for producing hydrogen and carbon monoxide by passing a mixture of steam carbon dioxide and sulphur vapour through an electric arc. In this invention metal sulphides such as pyrites are used in an electric furnace, preferably a tubular-flame arc furnace, into which the pulverised sulphide is blown together with the gas. The metal formed also reacts, yielding further quantities of hydrogen or carbon monoxide.

181,365. PREVENTING OXIDATION. C. Moureu, College de France, Paris, and C. Dufraisse, 189, Rue de Tolbiac, Paris. International Convention date, June 8, 1921.

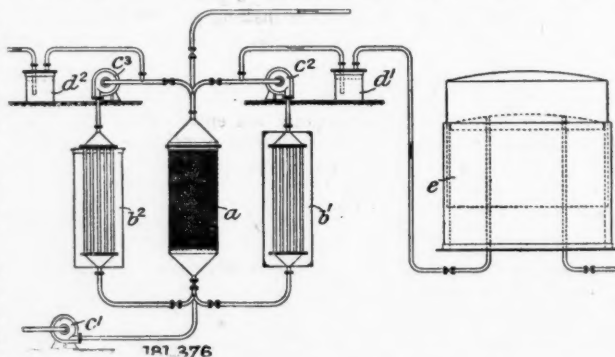
Chemicals, oils, essences, resins, rubber latex, etc., may be stabilised and prevented from oxidising by adding a small proportion of a phenolic body. Styrolene, furfural and acetaldehyde may be treated with pyrogallol or guaiacol, and vegetable oils such as linseed or nut oil with hydroquinone to stabilise them.

181,375. MAGNESIUM CHLORIDE. Aktieselskabet de Norske Saltverker, 71, Kong Oskars Gate, Bergen, Norway. International Convention date, June 13, 1921.

A mixture of magnesium oxide and carbon is treated in a revolving converter at 300° C. or above, with chlorine. The mixture must be perfectly dry, and the carbon free from gas. The temperature is maintained by the heat of the reaction, anhydrous magnesium chloride being produced.

181,376. SEPARATING GASES OR VAPOURS. T. Goldschmidt Akt.-Ges., 18, Salkenbergschweg, Essen, Germany. International Convention date, June 9, 1921.

Gas which is to be treated for the recovery of a constituent by adsorption in carbon, is passed by a blower *c*¹ through an adsorbing tower *a*, which is then put into communication



with a heater *b*¹. Enriched gas from a previous operation is forced by a blower *c*² through the heater *b*¹ into the tower *a*, to expel the adsorbed gas. The adsorbent is cooled by admitting cold enriched gas from a previous operation, or fresh gas, from a cooler *b*². Surplus gas passes through a valve *d*¹ into a gas holder *e*.

- 181,385. BROMIDES AND CHLORIDES. B. H. Jacobson, 1324, Quarriere Street, Charleston, W. Va., U.S.A. International Convention date, June 10, 1921.

The process is for producing anhydrous chlorides of aluminium, antimony, arsenic, iron, tin or zinc. The bromide is first produced by the reaction of the metal with bromine, and is then treated with chlorine, or alternatively the metal is treated with chlorine in the presence of bromine. In the case of aluminium, bromine is poured on the metal yielding the bromide in liquid form with rise of temperature. Chlorine is then passed through the liquid, displacing the bromine which is recovered in a condenser.

- 181,388. BASIC MAGNESIUM CARBONATE. Chemische Fabrik Griesheim-Elektron, 51, Gutleutstrasse, Frankfurt-on-Main, Germany. International Convention date, June 11, 1921.

Normal magnesium carbonate is emulsified with water in a homogenising apparatus at 40°-50° C., yielding a basic carbonate of the composition $4 \text{MgO} \cdot 3 \text{CO}_2 \cdot 4 \text{H}_2\text{O}$. To obtain the normal carbonate, a solution of magnesium chloride is mixed with ammonium carbonate solution in homogenising apparatus, yielding a carbonate of the composition $\text{MgCO}_3 \cdot 3 \text{H}_2\text{O}$.

- 181,391-2-3-4-5. CELLULOSE ETHERS AND THEIR TREATMENT. L. Lilienfeld, 1, Zeltgasse, Vienna. International Convention date, June 13, 1921.

181,391. The process is for treating cellulose alkyl ethers which are insoluble in water at 16° C., but swell or dissolve at lower temperatures. The ether is treated below 16° C. with water which may contain glycerine, sugars, soaps, Turkey red oil or acids, and may then be dyed with substantive, acid, basic, mordant, vat, or sulphur dyes. The ethers may be in the form of artificial silk, films, etc., and may contain cellulose nitrate, acetate or formate, softening agents such as camphor, naphthalene or its derivatives, phosphoric esters of phenols, and filling materials. Tanning agents or agents capable of precipitating albumen may be added before, during, or after dyeing.

181,392. Cellulose ethers either crude or as manufactured products which are soluble or swell in cold water, are rendered insoluble by treating with a reagent capable of precipitating albumen, such as tannin or other tanning agent, trichloroacetic acid, phosphotungstic acid, chrome or potash alum, or aluminium sulphate. The cellulose ethers may be treated in solution in water or organic solvents such as acetic acid, benzol-alcohol, chloroform, etc. The solutions in organic solvents may be worked up or the products may be precipitated by adding water.

181,393. To produce alkyl ethers of cellulose insoluble in water at 16° C., but soluble at lower temperatures, cellulose, cellulose hydrate, hydrocellulose or oxycellulose are treated with an alkylating agent such as a dialkyl sulphate or alkyl halide at a temperature of 40°-180° C. in the presence of 0.3 to 2.5 parts of water and 0.6 to 3.0 parts of caustic alkali. These products may be used for making articles which have to be incorporated with water-soluble substances such as dyes. Examples are given.

181,394. Alkyl ethers of cellulose such as those described in 181,393 above are converted into artificial silk by spinning from a solution in an organic solvent. Other cellulose derivatives and softening or plastifying agents may be added. Ethers soluble in cold water may also be used in aqueous solution, and substances such as viscose, cuprammonium cellulose, etc., may be added.

181,395. Alkyl ethers of cellulose of the kind described in 181,393 above, are produced by treating an alkyl ether soluble in water at 16° C. with caustic alkali and an alkylating agent, the caustic alkali being between 0.1 and 0.25 of the amount of water present. Detailed examples are given.

- 181,673. ALKALI FUSIONS. National Aniline and Chemical Co., Inc., 21, Burling Slip, Manhattan, New York (Assignees of D. G. Rogers, 318, Linden Avenue, Buffalo, N.Y., U.S.A.) International Convention date, June 17, 1921.

Organic compounds are fused with caustic alkali in the presence of liquid hydrocarbons such as kerosene. The

process is applicable to condensation reactions or the replacement of the sulphonic group or chlorine by hydroxyl. Examples of the preparation of dyestuffs are given.

LATEST NOTIFICATIONS.

- 184,153. Manufacture of hydrogen peroxide. Chemische Fabrik Weissenstein Ges. August 3, 1921.
184,170. Continuously-working distilling-apparatus for the distillation of tar or other suitable raw materials. Verein Fur Chemische und Metallurgische Produktion. August 5, 1921.
184,193. Process for the production of a blue vat dyestuff of the anthracene series. Badische Anilin- und Soda- Fabrik. August 4, 1921.

Specifications Accepted, with Date of Application

- 160,427. High temperatures, Method of producing—and the use thereof for reducing refractory oxides. A. Pacz. March 19, 1920.
162,618. Desulphurising iron and steel, Process of. H. Koppers. April 28, 1920.
164,329. Sugar from wood and other cellulose containing substances, Process for the manufacture of. A. Classen. June 4, 1920. Addition to 142,480.
165,788. Decolourising charcoal of high activity, Process for the manufacture of. R. Adler. July 5, 1920.
167,157. Allyl arsenic acid, Process for the manufacture of. F. Hoffmann-la Roche and Co., Akt.-Ges. July 26, 1920.
167,164. Magnesium compounds, Reduction of. L. Waldo. July 31, 1920.
173,733. Silver alcosols, Process for the production of—with the aid of organic bodies. Soc. Chimique des Usines du Rhone. January 5, 1921.
183,504. Coal, Concentration of. F. B. Jones and Minerals Separation, Ltd. February 22, 1921.
183,507. Tin, Treatment of. A. E. White. (*American Smelting and Refining Co.*) February 24, 1921.
183,527. Desulphurising oils, Means for. A. C. Nesfield. March 24, 1921.
183,535. China clay or like clays, Treatment of. T. Rigby. April 16, 1921.
183,566. Peat, Method of an apparatus for disintegrating, dehydrating and otherwise treating—for fuel or distillation purposes. C. W. G. Clewlow. April 25, 1921.
183,629. Synthetic resins, Preparation of. D. G. Anderson and R. Maclaurin. May 17, 1921.
183,666. Furnaces. D. E. Erickson. June 14, 1921.
183,671. Hypochlorites and chlorates, Process for the production of—and apparatus therefor. M. Wilderman. June 16, 1921.
183,682. Coal tar, mineral oils, and the like, Stills for continuous distillation of. J. A. Yeadon. June 30, 1921.

Applications for Patents

- Alexander, A. E., and Stokes, J. S. Synthetic resins and process of making same. 21914. August 11.
Barrett, F. L., Tootal Broadhurst Lee Co., Ltd., and Coward, H. F. Cellulosic material and manufacture thereof. 21889. August 11.
Blicquy, J. de, and Callebaut, C. Dyeing-machines. 21963. August 12.
Brandwood, J. Apparatus for continuous dyeing, etc., of textile fibres in loose state. 21962. August 12.
Dewey and Almy Chemical Co. Sealing-compositions. 21823. August 10. (United States, April 28.)
Distillers Co., Ltd., and Meyer, E. A. Production of strong alcohol. 21940. August 11.
Dreyfus, H. Manufacture of products from cellulose derivatives. 21915. August 11.
Ephraim, J. Method of producing sulphides and hydrosulphides of the alkali metals. 21997. August 12. (Germany, August 20, 1921.)
Farbwerke vorm. Meister, Lucius and Brüning. Manufacture of thiohydriens. 21717. August 9. (Germany, August 27, 1921.)
Farbwerke vorm. Meister, Lucius and Brüning and Imray O.Y. Manufacture of alkylated acids and derivatives thereof. 22006. August 12.
Lever Bros., Ltd., and Thomas, E. A. Hydrogenation of oils and fats. 21585. August 8.
Marcotte, P. L. G. Processes for utilisation of luminescent and catalytic substances. 21824. August 10. (France, August 13, 1921.)
Ramage, A. S. Hydrocarbon peroxide and process of producing same. 21734. August 9.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

LONDON, AUGUST 17, 1922.

The general trend of things is decidedly brighter, although markets are still in holiday mood. The consumptive demand shows the usual holiday dislocation. Prices are firm almost without exception. Supplies of many articles are on the short side, and the general tendency is upward.

Export trade has been quieter.

General Chemicals

ACETONE again shows a tendency to advance in price, and stocks are light.

ACID ACETIC is an active market. Supplies are promptly absorbed, and, following the advance in raw materials, prices are steadily increasing.

ACID CITRIC is slow of sale, and stocks are inclined to hang fire.

ACID FORMIC has been a more active market; price unchanged.

ACID LACTIC is uninteresting.

ACID OXALIC.—Much better business is reported; there is no change in price.

ACID TARTARIC is rather weaker owing to the entire absence of demand. Makers do not seem inclined to reduce the price.

BARIUM CHLORIDE is very scarce; the price has reached dangerous heights.

CREAM OF TARTAR has been fairly active; price unchanged.

IRON SULPHATE is unchanged.

LEAD ACETATE is a strong market, and the article is in steady demand.

LEAD NITRATE is without special feature.

LITHOPONE has been in better inquiry; the price is thought to have touched bottom.

POTASSIUM CARBONATE is unchanged.

POTASSIUM CAUSTIC still inclines in buyers' favour.

POTASSIUM PRUSSATE remains scarce and dear in all positions.

SODIUM ACETATE.—A good business is reported, and the price has advanced.

SODA NITRITE has been rather quieter, and stocks are firmly held. Makers' price is unlikely to be reduced.

SODIUM PHOSPHATE is unchanged.

SODIUM PRUSSATE.—A fair business is indicated, and supplies for this year's delivery are very short.

WHITE LEAD is unchanged.

ZINC OXIDE is dearer, and supplies of the high-grade qualities are scarce.

Coal Tar Intermediates

Business continues fairly quiet and the effect of the August holidays is reflected in home trade conditions. Export however, continues slowly to grow in interest, and the British and Continental values are more and more approximating one to another.

ALPHA NAPHTHOL is quiet in this country, but has been in demand on export account, and good orders have been placed.

ALPHA NAPHTHYLAMINE is steady and firm.

ANILINE OIL AND SALT are not particularly interesting, but the usual home trade is moving in the former.

BENZIDINE BASE is quiet.

BETA NAPHTHOL has been enquired for on home account, and the price is easy.

BETA NAPHTHYLAMINE is without change.

DIMETHYLANILINE is firm.

DIPHENYLAMINE is a hard market, with small stocks available.

"H" ACID is without special feature.

NAPHTHIONIC ACID is steady.

PARANITRANILINE is quiet.

PARAPHENYLENEDIAMINE is firm and in good demand.

RESORCIN is in fair inquiry, and without change in price.

Coal Tar Products

There is still a firm market for the majority of the products.

90's BENZOL is steady at 2s. per gallon, on rails.

PURE BENZOL is in poor demand, with sellers at 2s. 4d. to 2s. 6d. per gal., according to position.

CREOSOTE OIL.—Stocks are at a low point, and prices remain very firm. To-day's quotations are 5½d. to 6d. per gal. on rails in the North, and 6½d. per gal. in the South.

CRESYLIC ACID.—The market is steady, although the demand is not quite so active. There are no changes in prices, which stand at 2s. 3d. to 2s. 4d. per gal. for the pale 97/99% quality and 2s. 2d. for pale 95% quality, while dark 95% is offered at 1s. 10d. to 2s. per gal.

SOLVENT NAPHTHA.—There is rather more activity, but prices remain at 1s. 8d. to 1s. 9d. per gal., on rails.

HEAVY NAPHTHA is neglected, with sellers at 1s. 8d. per gal.

NAPHTHALENE.—Very dull, without change in price.

PITCH.—The demand for this material is not quite so strong, but stocks are low and prices well maintained. Business is reported at 80s. f.o.b. East Coast for this year, while some sellers ask an advance on this price.

Current Prices

Chemicals

		Per	£	s.	d.		£	s.	d.	
Acetic anhydride	lb.	0	1	8	to	0	1	10
Acetone oil	ton	77	10	0	to	80	0	0
Acetone, pure	ton	77	10	0	to	80	0	0
Acid, Acetic, glacial, 99-100%	ton	67	0	0	to	68	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic, liquid, 2000 s.g.	ton	67	0	0	to	70	0	0
Boric, cryst.	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6	to	0	0	6½
Citric	lb.	0	2	3	to	0	2	4
Formic, 80%	ton	65	0	0	to	66	0	0
Gallic, pure	lb.	0	2	11	to	0	3	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	38	0	0	to	40	0	0
Pyrogallic, cryst.	lb.	0	6	0	to	0	6	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	5	to	0	1	6
Sulphuric, 92-93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	5	to	0	1	5½
Alum, lump	ton	10	0	0	to	10	10	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14-15%	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17-18%	ton	11	10	0	to	12	0	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
Ammonia, .880	ton	33	0	0	to	35	0	0
Ammonia, .920	ton	21	0	0	to	23	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	74	0	0	to	75	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	ton	60	0	0	to	68	0	0
Barium Chloride	ton	23	0	0	to	23	10	0
Nitrate	ton	27	10	0	to	30	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	3
Bleaching powder, 35-37%	ton	12	0	0	to	—	—	—
Borax crystals	ton	29	0	0	to	33	0	0
Caffeine	lb.	0	13	0	to	0	14	0
Calcium acetate, Brown	ton	9	0	0	to	9	10	0
.. .. . Grey	ton	13	10	0	to	14	0	0

	Per	£	s.	d.	to	£	s.	d.
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	10	0	to	7	0	0
Carbon bisulphide	ton	50	0	0	to	52	0	0
Casein, technical	ton	47	0	0	to	55	0	0
Cerium oxalate	lb.	0	4	6	to	0	4	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	115	0	0	to	117	10	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	68	10	0	to	70	0	0
Formusol (Rongalite)	lb.	0	2	6	to	0	2	9
Glauber salts, commercial	ton	5	10	0	to	6	0	0
Glycerine, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	47	0	0
Nitrate	ton	46	10	0	to	48	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	23	10	0	to	24	0	0
Magnesium chloride	ton	10	0	0	to	10	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	8	0	0	to	8	10	0
Sulphate (Druggists')	ton	13	10	0	to	14	10	0
Manganese, Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	60	0	0	to	62	0	0
Methyl acetone	ton	60	0	0	to	65	0	0
Alcohol, 1% acetone	ton	65	10	0	to	66	0	0
Nickel sulphate, single salt	ton	49	0	0	to	51	0	0
Ammonium sulphate, double salt	ton	51	0	0	to	52	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	6½	to	—		
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride, 80%	ton	12	0	0	to	12	10	0
Chlorate	lb.	0	0	4½	to	0	0	5
Metabisulphite, 50-52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	4	6	to	0	4	9
Prussiate, yellow	lb.	0	1	7½	to	0	1	8½
Sulphate, 90%	ton	13	0	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to	—		
Seconds	cwt.	3	0	0	to	—		
Sodium acetate	ton	24	10	0	to	24	15	0
Arseniate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5½	to	—		
Bisulphite, 60-62%	ton	23	0	0	to	24	0	0
Chlorate	lb.	0	0	3½	to	0	0	4
Caustic, 70%	ton	20	10	0	to	21	0	0
Caustic, 76%	ton	21	10	0	to	22	10	0
Hydrosulphite, powder, 85%	lb.	0	1	9	to	0	2	0
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	18	10	0	to	19	0	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	11½	to	0	1	0
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	21	10	0	to	23	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	50	0	0	to	55	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Theobromine	lb.	0	14	0	to	0	14	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	36	0	0	to	38	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.	to	£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	3	0	to	0	3	3
Alphanaphthylamine	lb.	0	2	0	to	0	2	1
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1

	Per	£	s.	d.	to	£	s.	d.
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	lb.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	9	to	0	2	0
Benzoate of soda	lb.	0	1	7½	to	0	1	9
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	4	to	0	1	4½
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorobenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorobenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	3	to	0	2	6
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorobenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6½
Metatoluylenediamine	lb.	0	4	6	to	0	4	9
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	0	to	0	3	3
Naphthionate of Soda	lb.	0	3	0	to	0	3	3
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	0
Nitrobenzol	lb.	0	0	9	to	0	0	9½
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorobenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorobenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	10	6	to	0	10	9
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	0	to	0	2	3
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Durham Chemical Manufacturers' Sports Ground

THE directors of the Washington Chemical Co., Ltd., manufacturers of carbonic acid gas, etc., Washington Station, co. Durham, have provided a sports ground and pavilion for the use of their employees. On August 12, in the presence of about 600 of the company's employees, Mrs. Newall performed the opening ceremony, in the unavoidable absence of Mr. F. S. Newall, the chairman of directors. She hoped that the sports ground would be of great advantage to all their workpeople both from the health and social points of view. In spite of the bad times through which industry had been passing, the company were doing their best to make life healthier and pleasanter. The arrangements were in the hands of a committee comprising Messrs. F. S. Newall, G. S. Newall, G. Wilson, W. Potter, R. J. Raeside, A. Cole, R. Reay, G. Lee, E. Noble, J. Martin, and the Misses B. Cooper and I. Wilson. Owing to the inclement weather, several items in the sports programme were cancelled. The following were the chief prize-winners at a flower show held during the afternoon:—VEGETABLES: G. S. Newall, G. Towers, Miss M. Dobson, R. J. Raeside, W. Lynch, W. Self, W. Lowery, W. Smith, H. Price, M. Robson and W. Thompson. FLOWERS: W. Lynch, J. Jobling, Miss M. Lee, C. Jenkins, G. S. Newall, Miss F. Farish, G. Errington, G. Palmer, R. Reay and W. Self.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

GLASGOW, AUGUST 16, 1922.

THE past week has shown little change in the amount of business put through and there is nothing of much importance to report.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100%, £56 to £58 per ton; 80% technical, £38 to £39; 80% pure, £43 to £44 per ton. Good inquiry for export.

ACID BORACIC.—Price unchanged. Crystal or granulated, £60 per ton; powdered, £62 per ton.

ACID CARBOLIC, CRYSTALS.—Quoted 6d. to 6½d. per lb.

ACID HYDROCHLORIC.—Small demand. 6s. 6d. per carboy ex works.

ACID OXALIC.—Price unchanged at 8d. per lb. spot delivery.

ACID SULPHURIC.—144°, £4 per ton; 168°, £7 5s. per ton; de-arsenicated quality, £1 per ton more.

ALUM LUMP POTASH.—Quoted £14 10s. to £15 per ton ex store.

ALUMINA SULPHATE.—In little demand; 14/15% about £9; 17/18%, £11 per ton c.i.f. U.K. port.

AMMONIA, ANHYDROUS.—Is. 9d. per lb. ex works.

AMMONIA LIQUID, 880°.—Price unchanged; about 3d. per lb. ex works.

AMMONIA MURIATE.—Galvanisers grey, £34 to £35 per ton; fine white on offer at £28 per ton c.i.f.

AMMONIA SULPHATE.—25¼%, £14 10s. per ton; 25½%, neutral, £15 13s. per ton ex works.

BARIUM CARBONATE, 98/99%.—Unchanged at £13 per ton c.i.f.

BARIUM CHLORIDE, 98/100%.—Price for English make, £22 per ton. Continental, £19 10s. c.i.f., U.K.

BARIUM NITRATE.—On offer at £22 per ton ex store.

BARYTES, FINEST WHITE.—Price unchanged. English, £5 5s. per ton ex works.

BLEACHING POWDER.—Unchanged. Spot lots, £12 15s. per ton ex station.

BORAX.—Price for crystal or granulated, £29 per ton; powdered £30 per ton.

CALCIUM CHLORIDE.—English make, £6 5s. per ton ex quay or station; Continental about 10s. per ton less.

COPPER SULPHATE.—Price unchanged, about £27 per ton ex quay.

COPPERAS, GREEN.—Small demand quoted £3 15s. per ton ex works.

GLAUBER SALTS.—Fine white quality, £5 per ton; large crystals £4 per ton.

LEAD, RED.—£39 per ton delivered; moderate demand.

LEAD, WHITE.—£51 10s. per ton delivered.

MAGNESITE, GROUND CALCINED.—Quoted £9 to £12 according to quality.

MAGNESIUM CHLORIDE.—Quoted £6 15s. spot delivery. On offer at £5 5s. c.i.f. prompt.

MAGNESIUM SULPHATE (EPSOM SALTS).—Price unchanged. Commercial quality, £7 5s. per ton; B.P., £9 10s. per ton.

METHYLATED SPIRIT, INDUSTRIAL, 64% O.P.—2s. 8d. per gallon delivered.

POTASSIUM CARBONATE, 90/92%.—Quoted £31 per ton ex store. Continental offers of £28 15s. per ton c.i.f. U.K.

POTASSIUM CAUSTIC, 88/92%.—Quoted £31 per ton ex store. Continental offers of £28 per ton c.i.f. U.K.

POTASSIUM CHLORATE.—English make 5d. per lb. Continental make 4d. per lb. c.i.f.

POTASSIUM NITRATE (SALTPETRE).—Price about £33 per ton, spot delivery. Lower offers from the Continent.

POTASSIUM PERMANGANATE.—Price about 9d. to 10d. per lb. delivered.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton ex quay or station; mineral water quality, £1 per ton less.

SODIUM BICHROMATE.—Price 5d. per lb. delivered.

SODIUM CARBONATE (SODA CRYSTALS).—£5 15s. per ton ex quay or station.

SODIUM CAUSTIC.—76/77%, £23 5s.; 70/72%, £21 5s.; 60% broken, £24; 98/99%, powdered, £26 15s. to £27 15s. per ton ex station.

SODIUM HYPOSULPHATE.—Commercial crystals, £13 to £14 per ton; pea crystals, £18 10s. to £19 10s. ex station.

SODIUM NITRATE.—Price remains unchanged; £14 per ton, 5s. extra for refined quality.

SODIUM SULPHATE (SALTCAKE 95%).—Moderate export inquiry. Unchanged at £4 per ton f.o.b.

SODIUM SULPHIDE, 60/62%.—Continental make on offer at £15 10s. per ton c.i.f. U.K.

STRONTIUM SULPHATE.—Native, £2 10s. to £3 per ton f.o.r.

SULPHUR.—Surplus Government stocks of Sicilian thirds are still available at £4 5s. to £4 15s. per ton; flowers, £14; roll, £13; rock, £12; ground, £12.

TIN CRYSTALS.—Quoted 1s. 2d. to 1s. 3d. per lb.

WAX AMERICAN TEST 122/124° (WHITE PARAFFIN SCALE).—Offered at 1½d. per lb. c.i.f.

ZINC CHLORIDE.—Quoted £20 to £21 per ton c.i.f. U.K. prompt.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL.—English makers' price unchanged at 1s. per lb.

ANILINE SALT.—Quoted at 1s. 1d. per lb.

"H" ACID.—Export inquiry. Price quoted, 6s. 6d. per lb. 100% basis f.o.b.

NITROSO PHENOL.—Home inquiry, 3s. 4½d. per lb. f.o.b. casks included.

PARA AMIDO DIPHENYLAMINE.—Export inquiry; 7s. per lb. f.o.b.

Cotton Research Association

Progress at Shirley Institute Laboratories

AT the annual meeting of the British Cotton Industry Research Association, held in Manchester on Wednesday, it was stated that the Shirley Institute was now in full work with its various laboratories, and was proving of great importance to the whole trade. There was a staff of forty-eight. It cost £40,000 a year to run the Institute.

Mr. Kenneth Lee, the chairman, stated that £30,000 of this money came from the trustees of the Cotton Trade War Memorial Fund. There was, he said, a limit during which this grant could be made, but so important were their discoveries and so material was likely to be their bearing on the industry, that by the time this outside help ran out those associated with the industry itself would realise it to be a business proposition to carry on the work at their own cost.

Dr. Crossley, the director of the institute, pointed out that they were now growing their own cotton for experimental purposes in their own hothouses. This was enabling them to watch most important developments and to make vital experiments, and they trusted that the result of their work would enable them to improve existing processes and discover others to such an extent as to tell in the interests of this great industry. Certain parts of their work had, of course, to be done in secret until the question of patents was settled, but it was in the interests ultimately of the whole trade.

Recent Wills

Dr. John Theodore Merz, The Quarries, Newcastle-on-Tyne, chemical manufacturer	£18,980
Mr. Frederick William Sanderson, The School House, Oundle, headmaster of Oundle	£28,041
Mr. John Thomas Middleham, The Hollies, Springvale Road, Sheffield, a director of Hadfields, Ltd.	£28,380
Professor William Gowland, F.R.S., Russell Road, Kensington, London, Emeritus Professor of Mining, Royal School of Mines	£17,414
Mr. David Rainy Brown, The Abbeyhill Chemical Works, Abbeyhill, Edinburgh, manufacturing chemist, of J. P. Macfarlan and Co.	£79,515

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Hamburg, August 14, 1922.

OWING to uncertainty as to the German future, business passing is restricted to turnovers of small parcels, mainly between dealers. Many of the merchants have exhausted their stocks, and seem to be willing to pay almost any price to get goods on spot to enable them to carry out the fairly important orders which have recently been received from abroad.

Scarcity of goods on the market and scantiness of raw materials at the factories—at the present rate of exchange importation is very difficult—are the main features prevailing.

Prices are rising from hour to hour, and the tendency is firming accordingly. Wild speculation is a noticeable feature of the market.

The following average quotations are given in marks per kilogram (d=domestic price, e=export price).

ACIDS: Acetic, unquoted. Oxalic, 98/100%, in fair request at 68 mk. d.; 170 mk. e.

INDUSTRIAL CHEMICALS: Alum, potash, crystal powder, 16.50 mk. d.; 20 mk. e.; lumps not quoted. Alumina sulphate, 14/15%, 16 mk. e.; 17/18%, 24.50 mk. e. Ammonia carbonate, 31 mk. d.; 65 mk. e. Barium chloride, 35 mk. d.; 59 mk. e. Bleaching powder, 110/115%, 15.50 mk. d.; 28 mk. e. Borax, powdered, 80 mk. d.; 92 mk. e. Calcium chloride, 70/75%, 8.75 mk. d.; 12.50 mk. e. Chrome alum, 63 mk. d.; 95 mk. e. Copperas, 6.80 mk. d.; 9.25 mk. e. Copper sulphate, 98/100%, in good request at 95 mk. e. Epsom Salt, 6 mk. d.; considerable quantities exported at 7.75 mk. e. Formaldehyde, 30%, not quoted; 40%, 140 mk. d.; 165 mk. e. Glauber's Salt, crystallised, 3.50 mk. d.; 6.75 mk. e. Lead, red, 98 mk. d.; 120 mk. e. White lead, not quoted owing to lack of offerings. Litharge, 96 mk. d.; 120 mk. e. Lithopone, red seal, 43 mk. d.; 58 mk. e. Magnesium chloride, 6.25 mk. d.; 9.75 mk. e. Naphthalene flakes, 37 mk. d.; 46 mk. e. Potash bichromate, incl. barrels, 150 mk. d.; 185 mk. e. Potash carbonate, 96/98%, 54 mk. d.; 86 mk. e. Potash caustic, liquor, 50°, 19 mk. d.; 88/92%, 51 mk. d. Potash chlorate, powdered, 50 mk. d.; 71 mk. e. Sal ammoniac, 98/100%, crystallised, 57 mk. d.; 83 mk. e. Sal ammoniac spirit 0.910, 18.50 mk. d.; 37 mk. e. Salt cake, 6.75 mk. d.; 10.75 mk. e. Soda ash, 23.50 mk. d.; 24.50 mk. e. Soda caustic, 125/128°, 54 mk. d.; 8.25 mk. e. liquor, 38/40°, 15.50 mk. d. Soda hyposulphite, crystallised, 21 mk. d.; 26 mk. e.; pea form, 26 mk. d.; 32 mk. e. Soda silicate, 38/40°, filtered, 5.50 mk. d.; 11 mk. e. Soda sulphide, 30/32°, 17.50 mk. d.; 19.50 mk. e.; 60/62%, 35 mk. d.; 47 mk. e. Sugar of lead, crystallised, 95 mk. d.; 135 mk. e. Zinc chloride, 39 mk. d.; 65 mk. e. Zinc white, red seal, 98 mk. d.; 125 mk. e.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Sydney	Perfumery and druggists' sundries	161
Argentina	Sulphuric acid and aluminium sulphate	4390 /F.L./C.C
Buda Pest	Sulphate of copper	180

Tariff Changes

IRELAND.—Import restrictions effective until December 6, 1922, unless previously annulled, apply, *inter alia*, to any petroleum spirit, naphtha, benzol, petroleum, paraffin oil, fuel oil, motor spirit or other inflammable liquid, or liquid or other substance capable of producing power; and any lubricating oil.

GERMANY.—The surtax levied when the "gold" duties of the German Customs Tariff are paid in paper currency has been increased to 11,900 per cent. for the period August 9-15.

PORTUGAL.—A new export surtax is leviable on a number of articles. Among the goods affected are oleaginous seeds (100 escudos per metric ton) and palm oil (150 escudos per metric ton).

Company News

ENGLISH MARGARINE WORKS (1919).—The share transfer books are closed until September 1.

BRADFORD DYERS' ASSOCIATION.—The board have declared an interim dividend for the current year on the ordinary shares at the rate of 1s. per share, less tax. Warrants will be posted on September 1.

PERUVIAN GOVERNMENT 5½ PER CENT. (SALT) LOAN, 1909.—Coupons due on August 15 on the loan and the drawn bonds for £17,120 may be presented at the offices of J. H. Schröder and Co., 145, Leadenhall Street, London.

BROKEN HILL PROPRIETARY CO., LTD.—The net profit for the year ended May 31 last was £103,000, after deducting £154,000 for depreciation and £131,000 for debenture interest. The provision of plant at the Newcastle Steel Works absorbed £890,000.

J. AND J. CUNNINGHAM, LTD.—The net capital expenditure for the year ended June 30 amounted to £8,856, and the renewals and depreciation fund has been increased by £16,569. After providing for the latter sum, and for bad debts, there is a credit balance of profit and loss, including £21,237 brought forward, of £41,237. The dividend on the ordinary shares for the year is 5 per cent. (the same), and £21,237 is carried forward.

SPICERS, LTD.—The report for the year to March 31 last states that after paying debenture interest for the year, "note" interest, and interim dividends on the preference and ordinary shares there remains £107,599. The directors recommend final dividends on 35,000 preference shares at the rate of 5 per cent. per annum for six months, £8,750; 30,000 preference shares at the rate of 5 per cent. per annum for seven months (paid in accordance with amalgamation agreement of May 12, 1922), £8,750; and on 50,000 ordinary shares, £15,000; forward, £75,099. The decrease in profits is accounted for by general depression in trade and a further reduction in stock values, stocks having been written down to current prices.

CENTRIFUGAL SEPARATORS, LTD.—The profit and loss account given in the report for the year ended March 31 last shows a gross profit of £2,898 and an actual loss for the year of £5,818. Creditors and debtors about balance at £3,582 and £3,993 respectively, and the largest item on the credit side of the balance-sheet is the £96,866 in respect of British and foreign patent rights and manufacturing facilities; these are taken at cost. There is an investment of 31,341 7 per cent. cumulative preference shares and 6,909 ordinary shares in Standardised China Clay Co., Ltd., all fully paid and of the denomination of £1, which figures in the accounts at only £100. This is explained in the report, which states that at the date of the previous accounts the re-conditioning of the works had not been begun, and they were standing idle. The work is now practically finished, and if the enterprise be successful the value of the company's interest is expected to be considerable. At the annual meeting, convened for Friday, the shareholders were to be asked to authorise the renewal, as a whole or in part, of the options on the subscription of "A" shares at par, which expire on October 14, on payment of 1d. on each £1 share affected.

Physical Properties of Tetryl

MESSRS. C. A. TAYLOR and Wm. Rinkenbach, assistant explosives chemists, in a study of the physical properties of tetryl being conducted at Pittsburgh, Pa., by the U.S.A. Bureau of Mines, have completed solubility data for tetryl in carbon tetrachloride, making determinations with a wagon pipette. The method consists simply in weighing a sample of the solution taken at equilibrium at a constant temperature, evaporating off the solvent, and weighing the residual tetryl.

Separation of Palladium and Platinum

IN the investigation of methods for assaying platinum, conducted by the U.S.A. Bureau of Mines, recent experiments have shown that with certain ores, especially when the quantity of platinum is considerable, nitric acid will not effect a separation of platinum and palladium. A method which has been found to be accurate and to result in a complete separation of these metals is described in Serial 2,351, "Separation of palladium and platinum by means of dimethylglyoxime," obtainable from the Bureau of Mines, Washington, D.C.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

- BAGGALEY, —, 68r, Ashton New Road, Clayton, chemist. £13 9s. 6d. June 14.
- BLUNT, W. H., AND SON, 70, Snow Hill, Birmingham, chemists. £16 4s. 4d. June 26.
- BROMWICH, William Alfred, Albert Works, Park Street, Camden Town, manufacturing chemist. £33 14s. 8d. June 23.
- JUDD, R. D., Wheathampstead, chemist. £20 6s. 10d. June 22.
- SIMMONDS, H., 25, Glenford Street, East Greenwich, druggist, £15 1s. 2d. June 22.
- SMITH, W. Stanley, 11A, St. James's Square, Holland Park, W., consulting industrial chemist. £18 os. 2d. June 27.
- SUTCLIFFE, Arthur, 39, Harrington Street, Gorton, Manchester, analytical chemist. £34 2s. 9d. May 15.
- WALLACE, Bernard, 69, Royal Arcade, Weston-super-Mare, chemist. £16 14s. 9d. June 27.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

- BEDFORD CHEMICAL CO., LTD.—Registered July 28, £500 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue £350; general charge.
- CRITCHLEY BROS. (DYERS), LTD., Pendleton.—Registered August 1, £100,000 first debenture, to R. Dobson and another, Mosley Street, Manchester; general charge. *£8,500. June 10, 1922.
- HEATHER (LIVERPOOL), LTD., manufacturing chemists.—Registered August 3, £400 mortgage, to W. B. Kent, Moseley, Birmingham; charged on 157, Earl Road, Liverpool. *— June 15, 1921.
- LAWRY, HAWKE AND CO., LTD., Callington, fertiliser manufacturers.—Registered July 19, £4,000 debentures; general charge.
- LONDON CHEMICAL WORKS, LTD., Southall.—Registered July 21, £15,000 debentures; general charge. *£2,683 15s. January 11, 1922.

Satisfactions

- BROTHERTON AND CO., LTD., Leeds, ammonia and tar distillers.—Satisfaction registered July 19, £9,000, registered September 4, 1903.
- McREA (HUGH), LTD., London, N., manufacturers of medicines, etc.—Satisfaction registered August 2, £2,500, registered December 7, 1920.
- SHERATON GLASS MANUFACTURING CO., LTD., London, S.W.—Satisfaction registered July 20, £7,500, registered September 6, 1916.

Receiverships

- BRITISH SCIENTIFIC INDUSTRIES, LTD.—A. Dobson, of 10, Park Row, Leeds, was appointed receiver and manager on July 22, under powers contained in mortgage debentures dated April 7, 1922.
- VICTORS, LTD.—A. White, of 26, Pall Mall, Manchester, was appointed receiver on July 8, 1922, under powers contained in debentures dated December 14, 1921, and January 3 and 10, and February 7, 1922.

London Gazette

Company Winding Up

- ALBY UNITED CARBIDE FACTORIES, LTD.—Sir W. B. Peat, 11, Ironmonger Lane, E.C.2, appointed liquidator, with a committee of inspection.

New Companies Registered

- ALLEN-MYTON TRADERS, LTD., Capel House, New Broad Street, London. Dealers in chemicals, oils, etc. Nominal capital, £5,000 in 3,750 preference shares of £1 each, and 25,000 ordinary shares of 1s. each.
- DEVON CLEANSERS, LTD., 1, Guildhall Chambers, High Street, Exeter. Soap and cleansing material manufacturers, dealers in chemicals, etc. Nominal capital, £500 in £1 shares.
- HIRST DRONFIELD, LTD. Soap manufacturers, manufacturing chemists, etc. Nominal capital, £500 in £1 shares. A subscriber: D. N. Forbes, 33, Old Broad Street, London.
- EXCELOID CO., LTD., 34, Birley, Street Blackpool. Manufacturers of and wholesale and retail dealers in a preparation styled "Exceloid." Nominal capital, £1,000 in £1 shares.
- FERTILISERS (MANCHESTER), LTD., 43, York Street, Manchester. Manufacturers of fertilisers, manufacturing chemists, etc. Nominal capital, £3,000 in £1 shares (1,000 10 per cent. cumulative preference and 2,000 ordinary).
- HAROLD E. CLOSS AND CO., LTD. Manufacturers of and dealers in drugs, chemicals, etc. Nominal capital, £10,000 in £1 shares. A subscriber: C. H. Perry, 52, Ainslie Wood Road, Chingford, Essex.
- HEXORAN CO., LTD., 68, Major Street, Manchester. Chemical manufacturers and merchants. Nominal capital, £500 in £1 shares.
- HULL LUBRICATING OIL CO., LTD., 22, High Street, Hull. Manufacturers of and dealers in lubricating and other oils, paints and colours, red and white lead, etc. Nominal capital, £1,000 in £1 shares.
- JAMES KAY AND SONS, LTD., Britannia Soap Works, Kenyon Street, Ramsbottom, Lancs. Manufacturers of and dealers in soap, chemicals, dyes and oils. Nominal capital, £52,000 in £1 shares (24,000 preference and 28,000 ordinary).
- MAGUIRE AND PATERSON, LTD., Commercial Buildings, Dame Street, Dublin. Match manufacturers. Nominal capital, £300,000 in 100,000 cumulative preference shares of £1 each, and 200,000 ordinary shares of £1 each.
- V. A. PICERNO, LTD., 92, Falcon Road, Battersea, London. Chemical merchants. Nominal capital, £5,000 in £1 shares.
- KAY POOLE, LTD., 17, Fenchurch Street, London. Essential oil distillers, etc. Nominal capital, £12,000 in 11,995 ordinary shares of £1 each, and 100 founders' shares of 1s. each.
- SUPERFLORO, LTD., 31, Duke Street, Aldgate, London. Perfumers, import and export merchants, etc. Nominal capital, £5,500 in 5,400 preference shares of £1 each, and 2,000 ordinary shares of 1s. each.
- GILMOUR TEMPLETON CO., LTD. Chemical manufacturers and dealers. Nominal capital, £100 in £1 shares. A subscriber: A. E. Jennings, 73, Ashbourne Road, Mitcham, Surrey.
- A. E. WHEATLEY AND CO., LTD. Importers and exporters of essences, gelatines and glues, chemicals and powders, essential oils, etc. Nominal capital, £3,000 in £1 shares. A director: A. E. Wheatley, 22, Marine Crescent, Waterloo.

